Report No.: 8003-093
Rev. No.: 2

FINAL DRAFT
MIDDLESEX SAMPLING PLANT
FEDERAL FACILITY SI REVIEW
DOCUMENTATION PACKAGE
PREPARED UNDER

WORK ASSIGNMENT NO. 019-2JZZ
CONTRACT NO. 68-W9-0051

SEPTEMBER 30, 1992
REVISED: AUGUST 4, 1994

VOLUME 6 OF 8

REFERENCE NO. 25

MALCOLM PIRNIE, INC.	PROJECT NOTES

To:File	Date:December 9, 1993
From:David Kahlenberg	Project #:8003-093
Subject: Remedial Action Descriptions	Site Name:Middlesex Sampling Plant

The following reference contains excerpts of remedial actions from vicinity residential properties to the Middlesex Sampling Plant site. These descriptions were taken from the following document: Ford, Bacon & Davis, "Compilation of Remedial Action Descriptions, Middlesex Sampling Plant & Associated Properties", prepared for the United States Department of Energy, Formerly Utilized MED/AEC Sites Remedial Action Program, April 1979.

NJ/MSP/GEN
FBD-NRN-7904

Prepared for

United States Department of Energy

Formerly Utilized MED/AEC Sites Remedial Action Program

Middlesex Sampling Plant & Associated Properties

Compilation of Remedial Action Descriptions

April 1979

by

Ford, Bacon & Davis
375 Chipeta Way
Salt Lake City, Utah

2

PREFACE

The Department of Energy is conducting a program entitled "Formerly Utilized MED/AEC Sites Remedial Action Program." The objectives of the program are to determine current radiological conditions and impacts at former Manhattan Engineer District/ Atomic Energy Commission sites, to develop remedial action options and costs, and to accomplish the remedial action.

The former Sampling Plant at Middlesex, New Jersey and associated properties where contamination has been found are included in the remedial action program.

The associated properties described in this volume are eligible for decontamination and restoration. Drawings of the properties showing the extent of contamination, and a description of the planned decontamination and restoration efforts are presented.

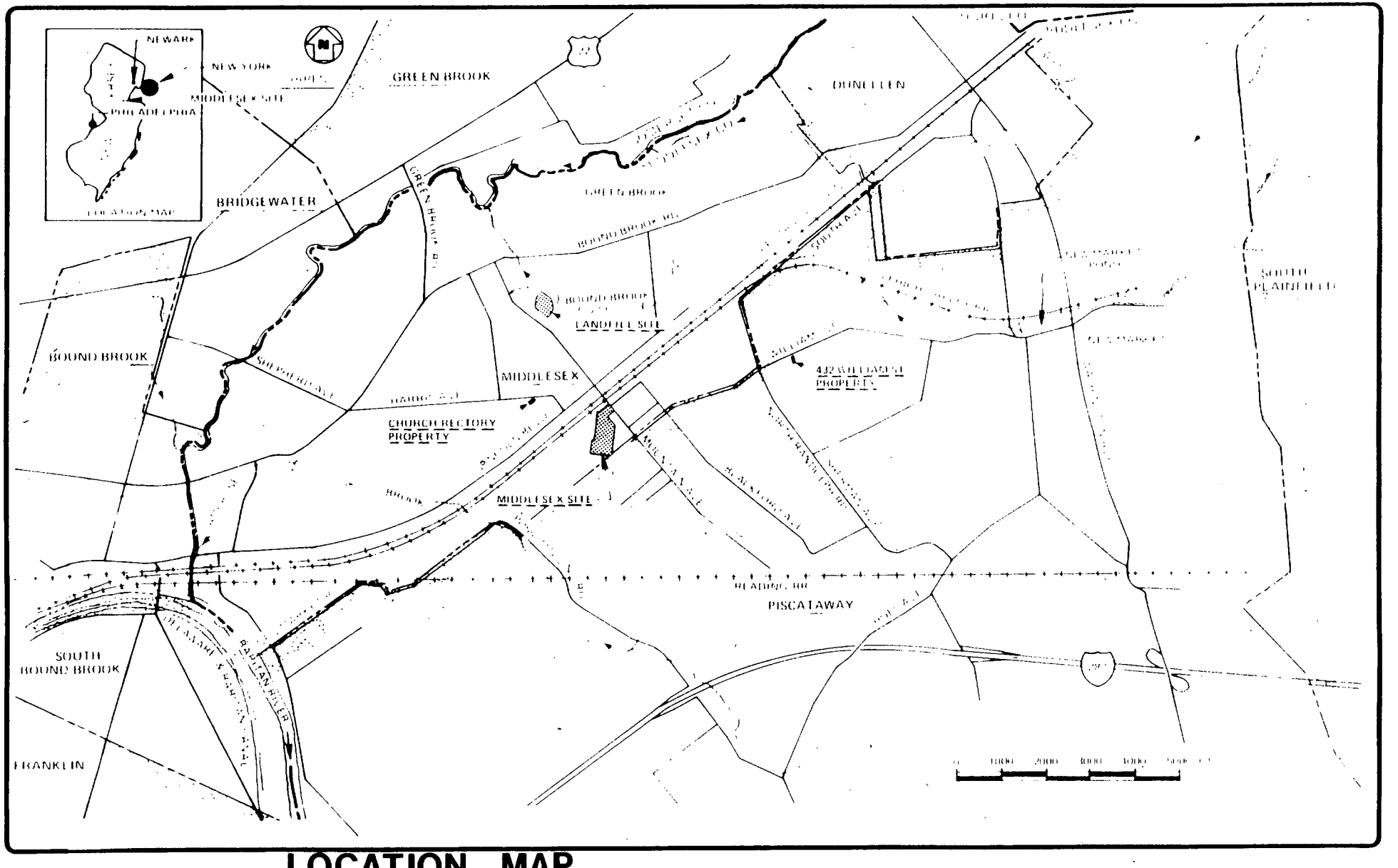
Insofar as possible, the Department of Energy and its contractors will attempt to minimize all displacements and inconveniences to the affected property owners and tenants. Affected properties will be restored to as near their original conditions as practicable after decontamination efforts are completed. Full cooperation and coordination with the property owners will be solicited to assure that the remedial actions taken are as compatible with their desires as possible.

This volume is a compilation of individual land owner

packages. The first parcel is presented in total. The remaining parcels are presented in sufficient detail to describe the actions for that parcel. The table of contents, location map, plantings inventory, and special provisions are common to all parcels and are only presented for Parcel I.

TABLE OF CONTENTS

Parcel No.	Parcel Owner
1-	Clement & Helen Ianiero
2-	Elizabeth M. Kisaday
3-	Kenneth C. Kohl
4-	Joseph & Mary Volgey
5-	Sasha Garcia
6-	Richard & Jonann Smith
7-	Pat & Anna Vastano Michael & Marie Vastano
8-	Anthony Rosamilia
9-	William B. Smith
10-	Doe Reality Corp., Inc.
11-	DeAngelis Builders, Inc.
12-	Borough of Middlesex
13-	Lon Construction Company
14-	DeAngelis Builders, Inc.
15-	Borough of Middlesex
16-	Phyllis Smith
17-	Raymond & Elaine Reefer
18-	Borough of Middlesex
19-	Adams Corporation Paul Goldman Inc. Richard Segal Associates
20-	Frank Pasek (Kesap Inc.)
21-	Borough of Middlesex
22-	Adams Corporation Paul Goldman Inc. Richard Segal Associates
23-	Wood Industries, Inc.
24-	Francis J. Zatika
25-	Lehigh Valley Railroad
26-	Sarantos Papghis
27-	Catholic Church Rectory
28-	Mack Affiliates
29-	Borough of Middlesex
30-	Edward H. Phillips



LOCATION MAP

PLANTINGS INVENTORY

QTY	REF. NO.	TREES
7	1T	Salix lucida Mild White Willow
1	2T	Salix discolor Putty Willow
0	3T	Populus deltoides Eastern Cottonwood
5	4T	Populus nigra (var. italica) Lombardy Poplar
1	5T	Juglans nigra Black Walnut
1	6T	Betula alba White Birch
2	7T	Betula populifolia Gray Birch
3	8T	Quercus palustris Pin Oak
16	9T	Morus alba White Mulberry
0	10T	Sassafras albidum Whitish Sassafras
1	11T	Malus coronaria Charlotte Crab Apple
0	12T	Malus atrosanguinea Chinese Crab Apple
13	13T	Malus pumila (var. niedzwetzkyana) Fruiting Apple Red Tip Crab Apple
3	14T	Malus floribunda Japanese Crab Apple
3	15T	Prunus glandulosa Dwarf Flowering Cherry
7	16T	Prunus sp (Prunus mahaleb) Sweet Cherry
0	17T	Prunus armeniaca Apricot fruit tree (common type)
3	18T	Robinia pseudoacacia Black Locust
0	19T	Rhus typhina Staghorn Sumac
6	20T	Acer saccharinum Silver Maple
15	21T	Acer platanoides Norway Maple
19	22T	Acer rubrum Red Maple
0	23T	Fraxinus americana White Ash
2	24T	Sambucus canadensis Canadian Elder
1	25T	Tamarix gallica French Tamarisk
1	26T	Ilex opaca American Holly
1	27T	Juglans sp Persian Walnut
0	28T	Pyrus sp Common Pear
0	29T	Viburnum plicatum Japanese snowball
0	30T	Acacia decurrens (var. dealbata) Green Wattle

QTY	REF. NO.	TREES
	31T	Ficus carica (var.) Common Fig Tree
3	32T	Taxus hatfieldii Hatfield's Yew
33	33T	Taxus hicksii Hick's Yew
52	34T	Taxus cuspidata (Henery) Henery Japanese Yew
0	35T	Pinus sylvestris Scotch Pine
2	36T	Juniperis virginiana Eastern Red Cedar
4	37T	Juniperis Pfitzeriana Chinese Juniper
5	38T	Picea pungens Blue Spruce
0	39T	Picea excelsa Norway Spruce
7	40T	Juniperis chinensis Chinese Juniper
1	41T	Chamaecyparis plumosa aurea Ornamental Cedar
1	42T	Cryptomeria lobbi Ornamental Redwood
1	43T	Ricinus communis Castor Oil Plant
2	44T	(Retinospora) Chamaecyparis plumosa False Cypress Plum
6	45T	Mimosaceae (mimosa)
0	46T	Fruiting Peach
1	47T	Populus tremula American Aspen
2	48T	Fruiting Plum

QTY	REF. NO.	SHRUBS
27	1S	Ligustrum ovalifolium California Privet
4	2S	Spiraea vanhouttei Bridal Wreath
2	3S	Berberis thunbergi Japanese Barberry
3	4S	Buxus sempervirens Dwarf Boxwood (common type)
1	5S	Rhododendron nudiflorum Pink Azalea
7	6S	Spiraea thunbergi Thunberg's Wreath
1	7S	Rosa rugosa Japanese Rose Bush
8	8S	Cornus florida Flowering Dogwood
10	9S	Syringa vulgaris Common Lilac
1	10S	Philadelphus virginalis Virginal Mock orange Bush
4	11S	Forsythia intermedia Spring Glory
0	12S	Forsythia spectabilis Arnold Giant
3	13S	Kalmia latifolia Mountain Laurel (Calico Bush)
2	14S	Rosa floribunda (Multiflora) (Climbing) Multiflowered Rose Bush
1	15S	Cactaceae sp Cactus
1	16S	Buxus macrophylla koreana Korean Box
10	17S	Hibiscus syriacus Rose of Sharon (Altea Shrub)
9	18S	Kerria japonica Japanese Kerria Garden
2	19S	Philadelphus floribunda Sweet Mock Orange
1	20S	Rosa officinalis (vulgaris) Common Rose Bush
1	21S	Hydrangea arborescens Annabelle's Water Vessel (or Hydrangea)
3	22S	Hydrangea paniculata (grandiflora) Peegee Hydrangea
0	23S	Rosa banksiae Climbing Rose
1		Hedera helix English Ivy (in tub)

QTY	REF. NO.	HERBACEOUS CATEGORY (FLOWERING)
4	1F	Convallaria majalis (European) Lily Of The Valley
11	2F	Rosa odorata (HYB) (Hybrid) Tea Rose
1	3F	Lilium tigrinum (HYB) (Hybrid) Tiger Lily
1	4F	Cydonia japonica Japanese Quince
6	5F	Paeonia officinalis Common Peony
6	6F	Iris versicolor Blue Flag Iris
2	7F	Iris cristata Crested Iris
1	8F	Althea rosea Hollyhock
5	9F	Sedum variegatum (Stonecrop or Orpine) Variegated Sedum
3	10F	Rhododendron obtusum (HYB) (or Azalea hinodegiri) Kurume Azalea
6	11F	Chrysanthemum Golden Flower
3	12F	Hemerocallis fulva Orange Day Lily
1	13F	Hemerocallis flava Yellow Day Lily
3	14F	Rhododendron (HYB) (Hybrid) Rose Tree
2	15F	(Funkia) Hosta albo marginata Plantain Lily
1	16F	Aquilegia sp Columbine
1	17F	Allium schoenoprasum Chives
0	18F	Foeniculum dulce Sweet Fennel
1	19F	Foeniculum vulgare Common Fennel

QTY	REF. NO.	FERNS
4	1	Yucca filamentosa Yucca Plant (Spanish Bayonet or Adam's needle)
1	2	Nephrolepis exaltata Tall Sword Fern

QTY	REF. NO.	VINES
1	1V	Polygonum auberti Silver Lace Vine
4	2V	Vitis Labrusca Fox Grape Vine
0	3V	Ribes uva crispa Garden Gooseberry
0	4V	Ribes odgratum Buffalo current
0	5V	Ribes sativum Red current

SPECIAL PROVISIONS

Any special provisions for handling personal property on site, or for agreements outside of the stated remedial action work will be included in this section.

Betterments to existing improvements, with the difference being paid by the property owner, also will be included in this section. Such betterments could include upgrading gravel driveways or walkways to asphalt paving or concrete, or installation of a patio slab.

Prepared for

United States Department of Energy

Formerly Utilized MED/AEC Sites Remedial Action Program

Middlesex Sampling Plant & Associated Properties

DESCRIPTION OF REMEDIAL ACTION

Property Owner

CLEMENT & HELEN IANIERO
LOTS 1-6, BLOCK 318
BOROUGH OF MIDDLESEX

1

April 1979

by

Ford, Bacon & Davis
375 Chipeta Way
Salt Lake City, Utah

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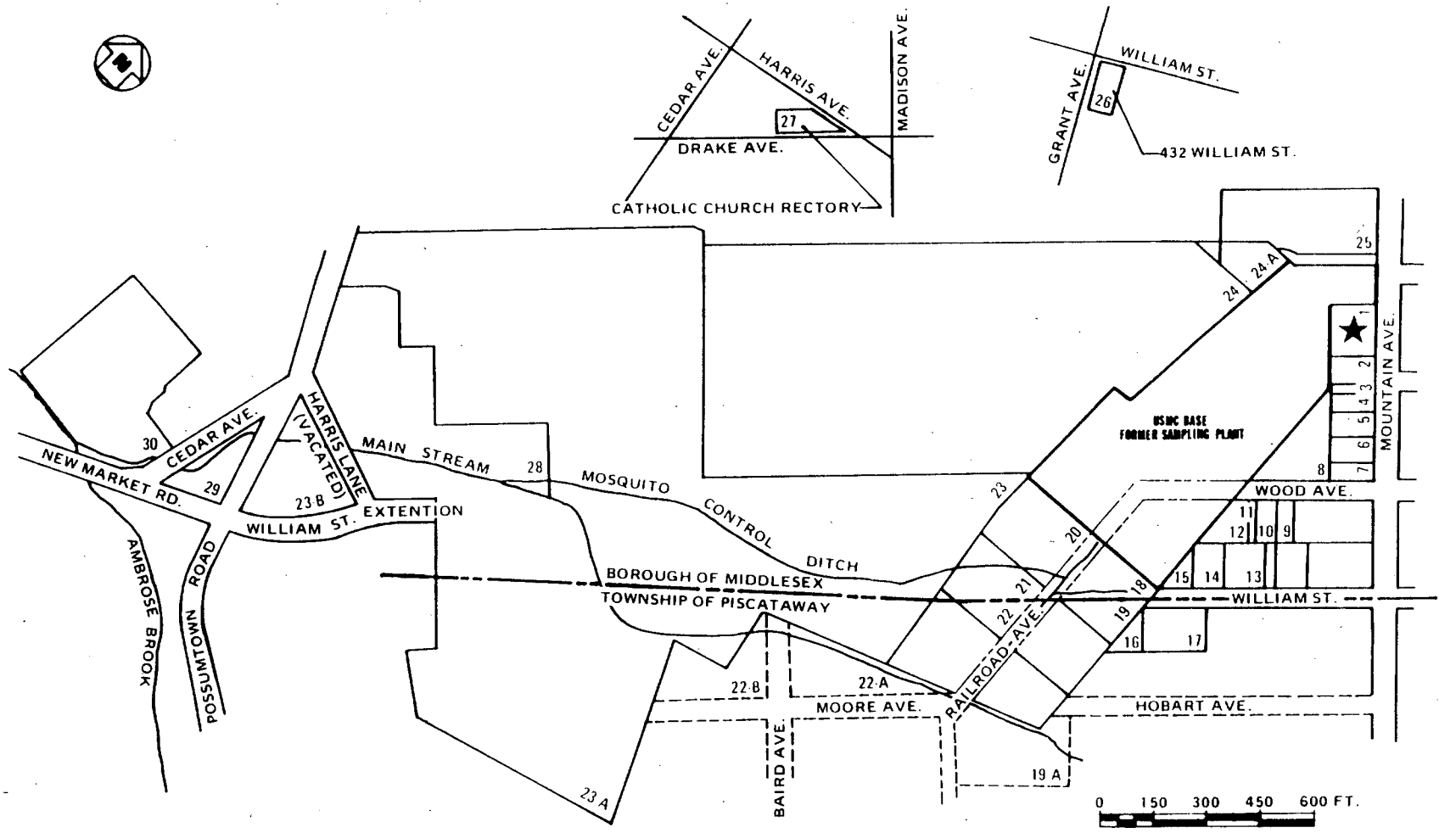

VICINITY MAP

★ **CLEMENT & HELEN IANIERO**
LOTS 1-6, BLOCK 318
BOROUGH OF MIDDLESEX

1

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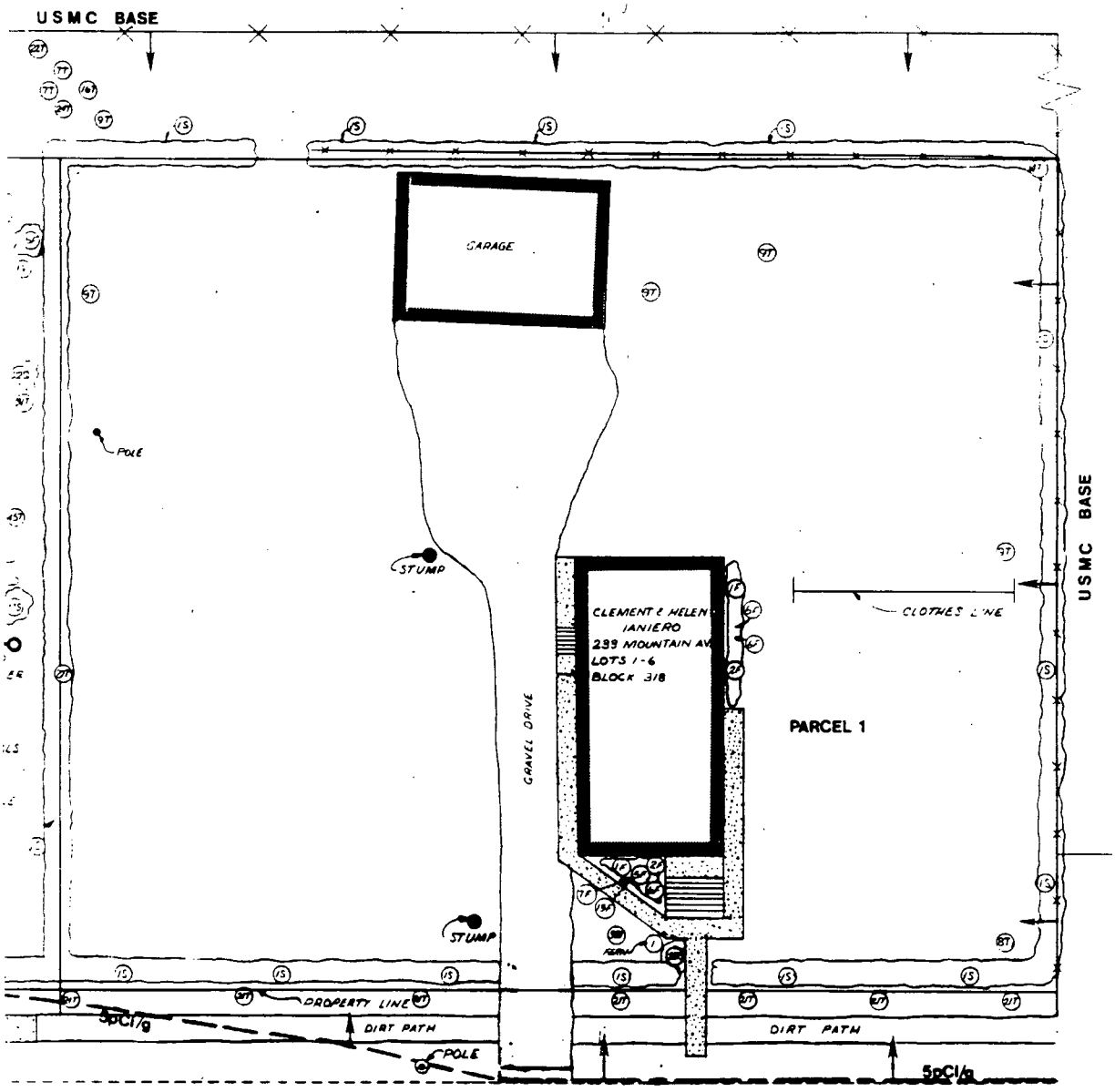
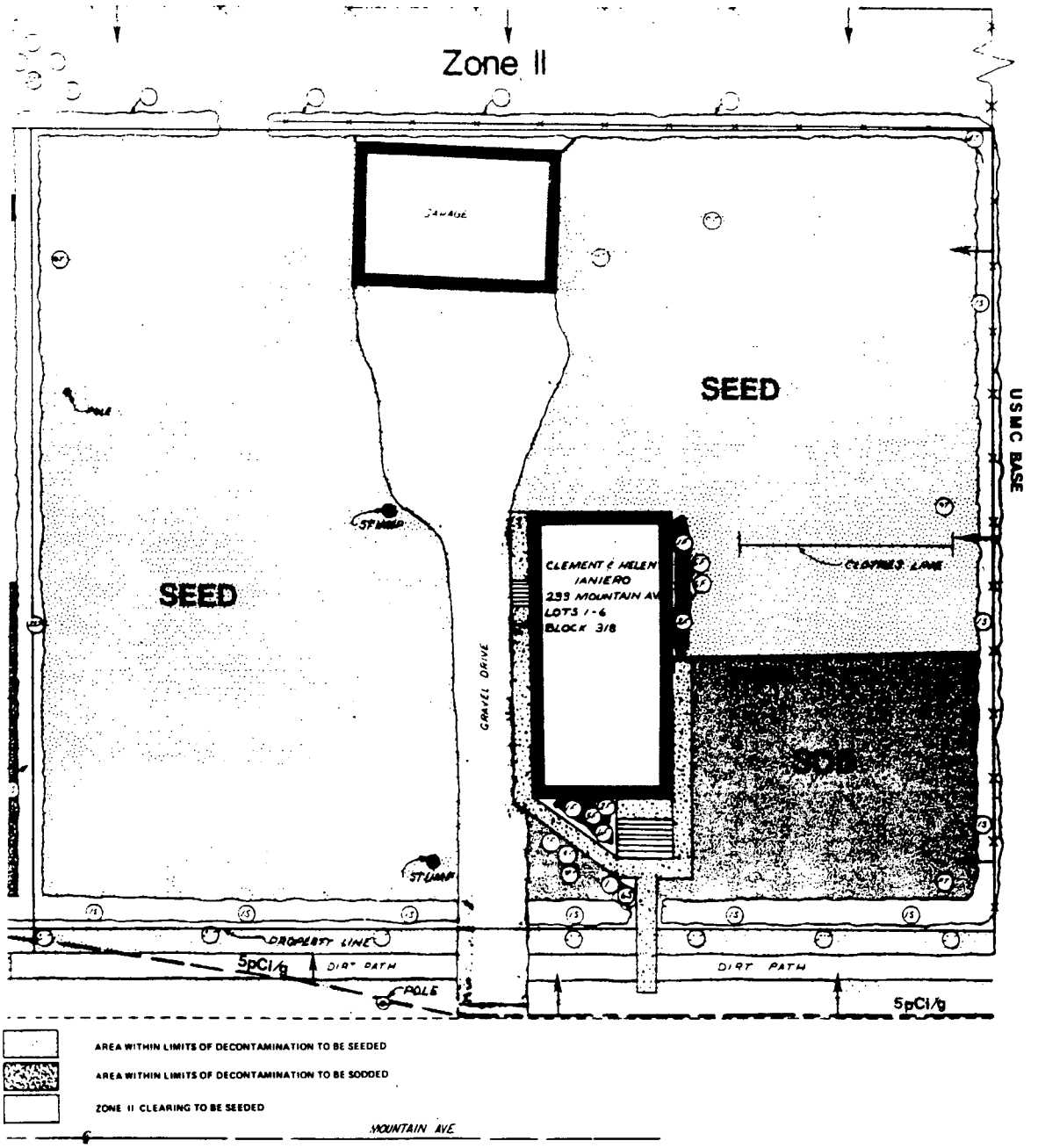


CLEMENT & HELEN IANIERO
LOTS 1-6, BLOCK 318
BOROUGH OF MIDDLESEX

1

PARCEL MAP



GRASS DESIGNATION MAP

CLEMENT & HELEN IANIERO
LOTS 1-6, BLOCK 318
BOROUGH OF MIDDLESEX

1

12

Clement & Helen Ianiero
233 Mountain Ave
Parcel 1
Lots 1-6, Block 318
Borough of Middlesex

DESCRIPTION OF REMEDIAL ACTIONS

Recent surveys have shown that low level radioactive contamination exists on this property. To remove this contamination as part of the overall remedial action program, it will be necessary to remove some of the improvements as well. Structures such as the residence or garage will not be disturbed. The property will be physically restored as nearly as reasonably practical to the conditions existing at the start of the decontamination activities. Efforts will be made to minimize disruptions and inconvenience to the occupants. When initiated, the work will be carried through to completion.

On this property, it is anticipated that the following improvements will be affected:

1 - Lawns and grassy areas

2 - Trees, shrubs, and flowers

3 - Sidewalks and pathways

4 - Driveways

5 - Clothesline poles

6 - Fences

It will be necessary to excavate contaminated soil, and vegetation and some improvements within the proposed limits of cleanup as shown on the Parcel Map. The exact limits and depths

will be determined at the time of excavation. The excavated areas will be filled with compacted backfill.

Lawns will be replaced with sod or topsoil as shown on the Grass Designation Map. Sod will be placed on four inches of topsoil. Areas planted with grass will receive six inches of topsoil.

Whenever possible plantings will be replaced in kind; however, larger trees and shrubs will be replaced with as large a size as reasonable. Whenever possible, large mature plantings will not be removed. The feasibility of saving the plantings will be dependent on the size and type of planting as well as the depth of excavation. The final determination as to which plantings can be left will be made at the time of excavation.

Concrete replacement sidewalks will be four inches thick and will be placed on six inches of compacted gravel. Gravel driveways will be composed of eight inches of compacted gravel.

The existing clothesline poles will be removed and reinstalled upon completion of backfilling operations. The existing fence at the back of the property will be removed and be replaced at the option of the property owner.

All uncontaminated personal items on the property that are to be saved will be removed, stored and returned to the property. Any of the owner's unwanted items on the property at the time of decontamination, will be disposed of by the contractors at the owner's option.

If the property owner desires any betterments to the existing improvements, these will be negotiated with the Department of Energy and will be included in the Special Provisions Section.

LAND OWNER
PACKAGE INVENTORY

OWNER

NAME: Clement and Helen Ianiero

ADDRESS: 233 Mountain Ave.

PROPERTY DESCRIPTION

LOT 1 Through 6

BLOCK

BORO/TOWNSHIP Borough of Middlesex

LEGAL DESCRIPTION: Same as Above

IMPROVEMENTS:

DWELLINGS:
- SQ. FT. Approx. 990 ft^2 (Main Level)
- LEVELS 3 plus basement
- CONST. Frame

GARAGE:
- SINGLE
- DOUBLE
- OTHER 3 Car (Block Construction)

STORAGE BUILDING:
- PREFAB
- OTHER

IMPROVEMENTS TO DWELLINGS:
- ADDITIONS
- PORCHES
- DECKS
- PATIO

DRIVEWAYS:
- CONCRETE
- PAVED
- GRAVEL Approximately 1900 ft^2
- UNIMPROVED

SIDEWALKS:
- CONCRETE Approximately 375 ft^2
- PAVED
- GRAVEL
- STONE
- BRICK

FENCES – GATES:

WOOD

CHAIN LINK 130 lf North & 110 lf West (Government Fence)

BARBED WIRE

OTHER

LANDSCAPING:

LAWN/GRASS SQ. FT. Approximately 8050 ft^2

TREES 4T-1 7T-2 8T-1 9T-5 16T-1 21T-7 22T-1 24T-1 38T-1

SHRUBS 1S-13 20S-1

HERBACEOUS CATEGORY (FLOWERING) 1F-2 2F-2 5F-2 6F-2 7F-1 13F-1

FERNS 1

VINES

VEGETABLE GARDEN

ROCK GARDEN

NOTE: ADDITIONAL INVENTORY OF TREES, SHRUBS, FERNS, VINES, AND HERBACEOUS CATEGORY ITEMS LISTED ON PAGE

MISCELLANEOUS PERSONAL PROPERTY ITEMS: Clothes Line Poles, Lawn Swings, Lumber Old Automobile Used Tires, Misc Barrels and Cans, Boxes, Pieces of Rain Gutter, Fuel Oil Tank, Misc. Rubbish Piles Near the Garage, Bathtub, Cast Iron Pipe Lengths Near Garage.

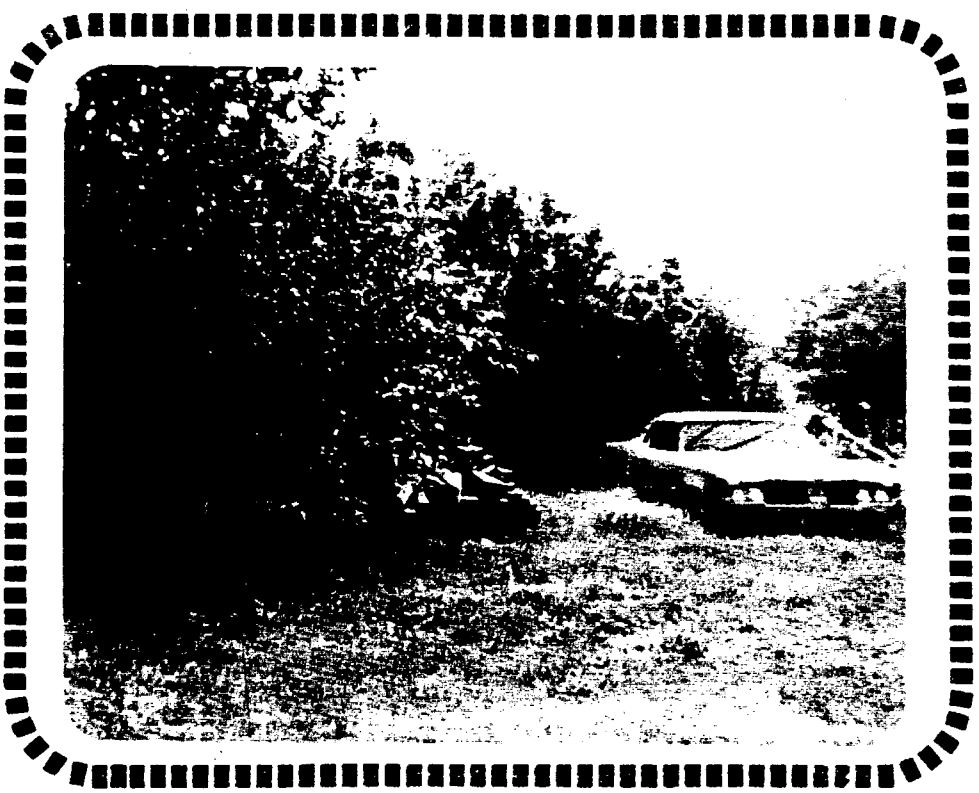
1

CLEMENT & HELEN IANIERO
233 MOUNTAIN AVE
LOTS 1-6, BLOCK 318
BOROUGH OF MIDDLESEX

Northeast Property Corner (IANIERO)

Northeast Corner of House (IANIERO)

East Side of House & 3 Car Garage (IANIERO)



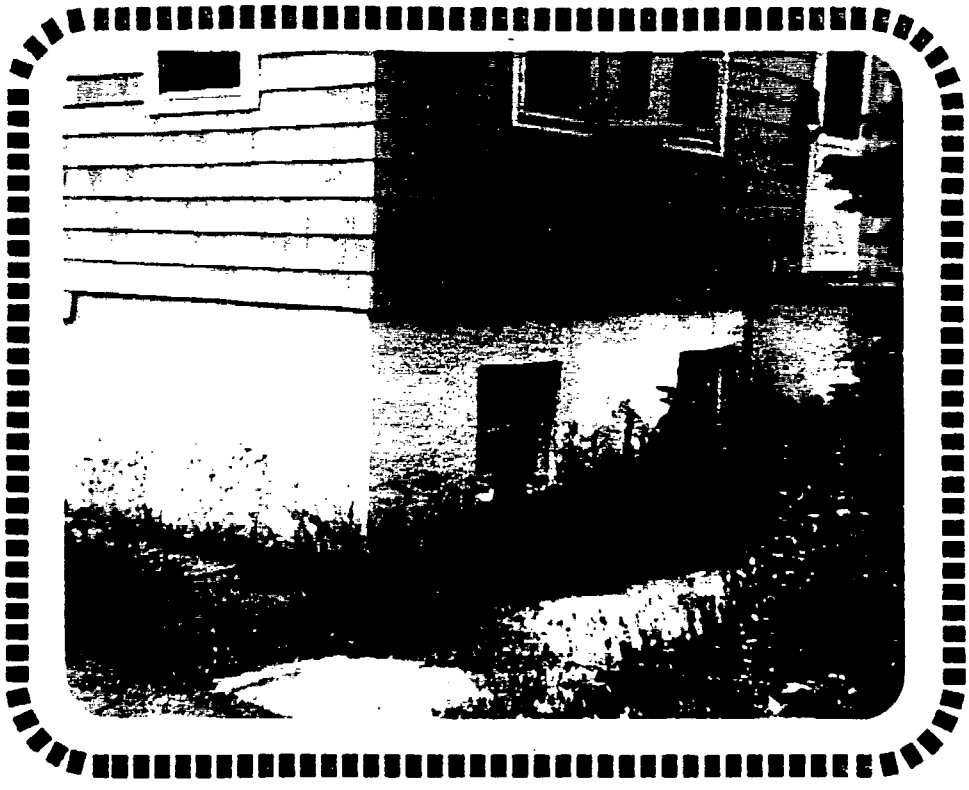
Southwest Corner of IANIERO

Area Between USMC Base and IANIERO

N.W. Corner of IANIERO

Dripline on Sidewalk on East Side of House (IANIERO)

Sidewalk & Steps to East Entrance (IANIERO)

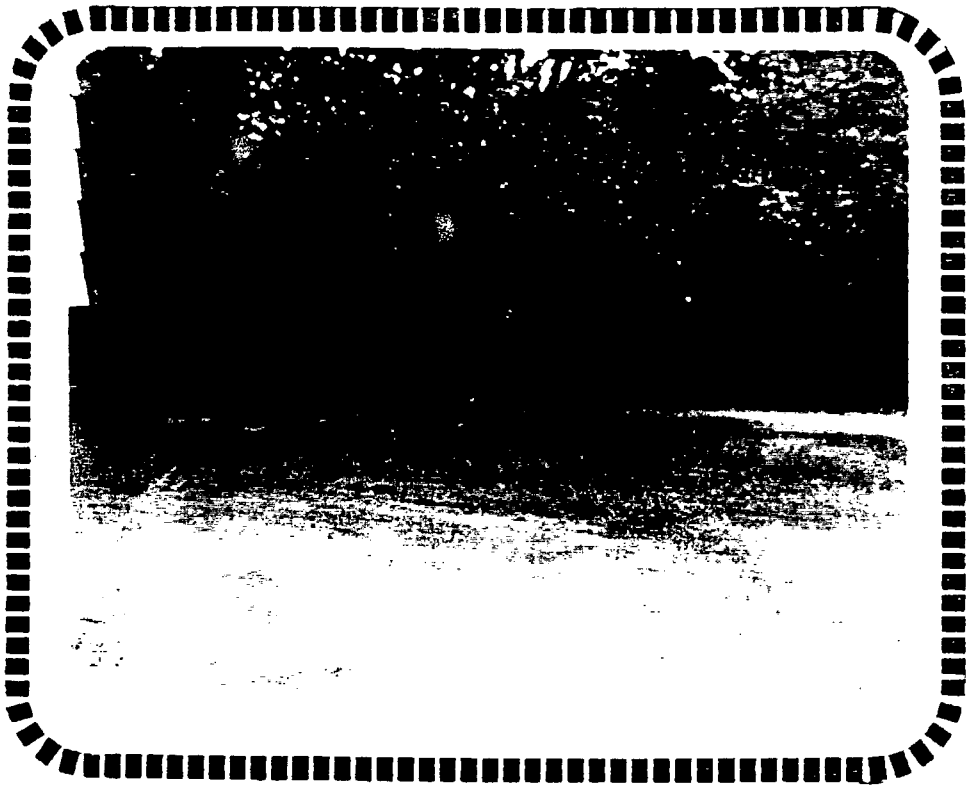


N.E. Corner of House (IANEIRO)

Downspout at N.E. Corner of House (IANIERO)

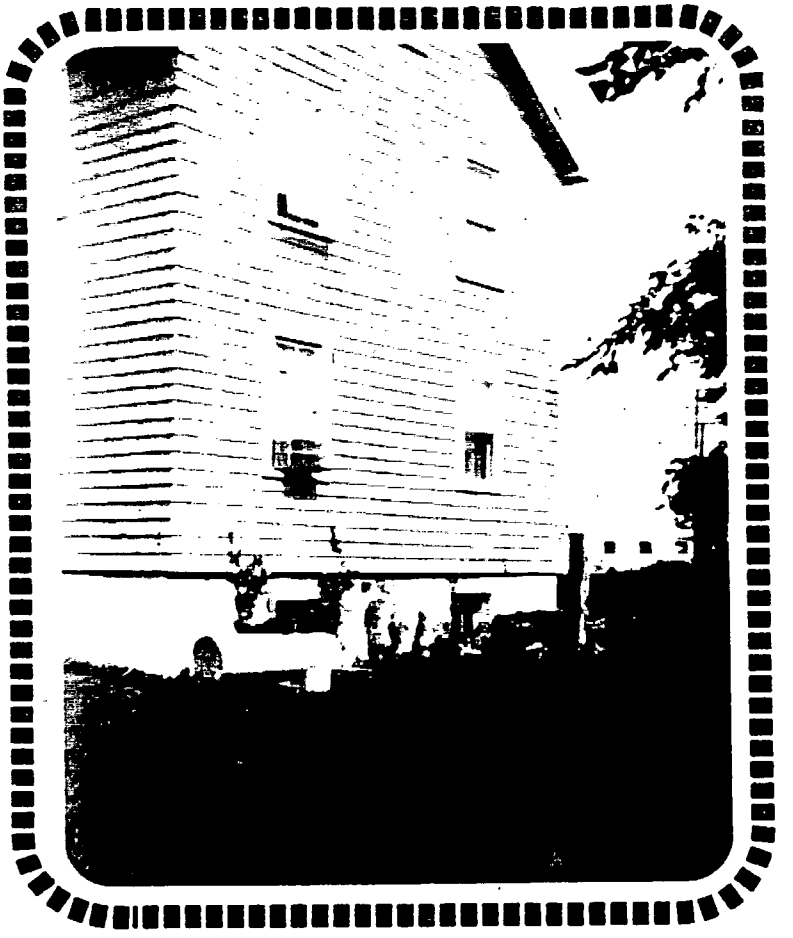
Sidewalk at N.W. Corner of House
(IANIERO)

Front (North) of House (IANIERO

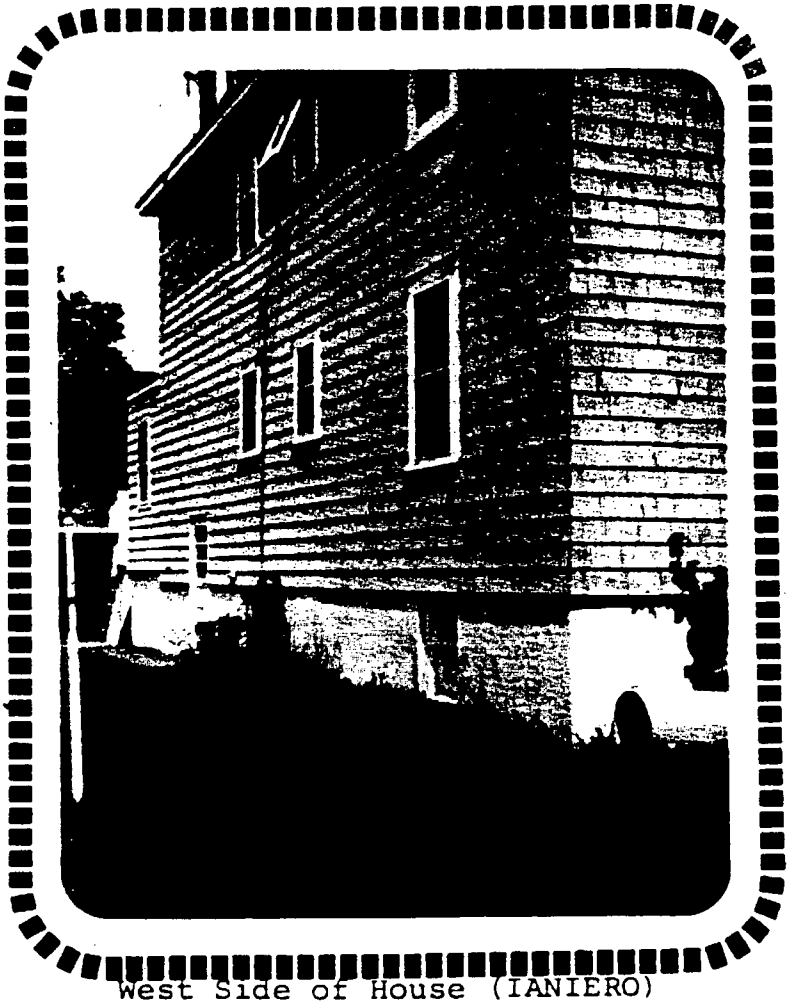


Area to the South of House (IANIERO)

Drip Line at West Side of House (IANIERO)



South Side of House (IANIERO)



West Side of House (IANIERO)

Prepared for

United States Department of Energy

Formerly Utilized MED/AEC Sites Remedial Action Program

Middlesex Sampling Plant & Associated Properties

DESCRIPTION OF REMEDIAL ACTION

Property Owner

ELIZABETH M. KISADAY
LOTS 7-9, BLOCK 318
BOROUGH OF MIDDLESEX

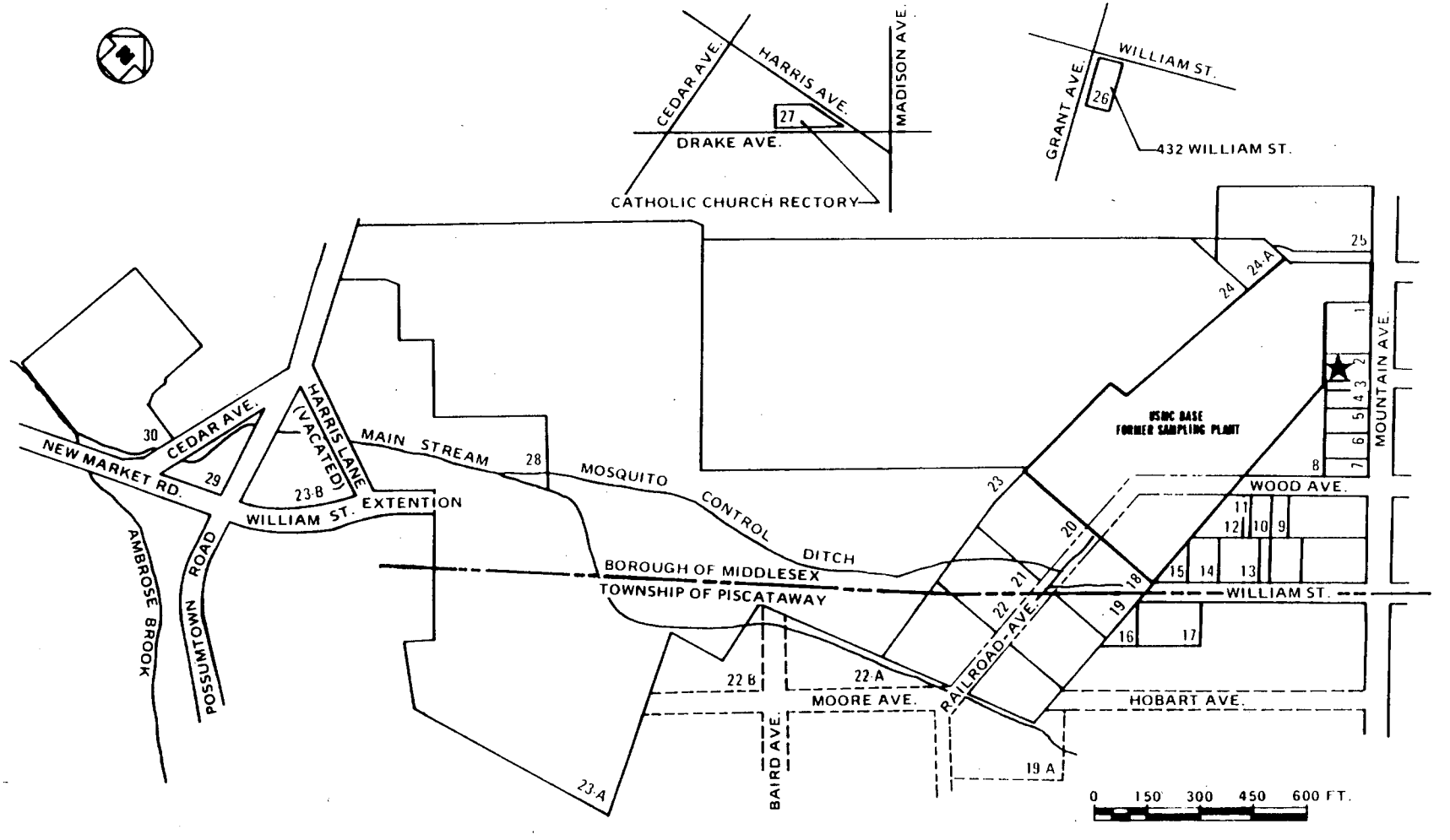
2

April 1979

by

Ford, Bacon & Davis
375 Chipeta Way
Salt Lake City, Utah

27



VICINITY MAP

★ **ELIZABETH M. KISADAY**
LOTS 7-9, BLOCK 318
BOROUGH OF MIDDLESEX

2

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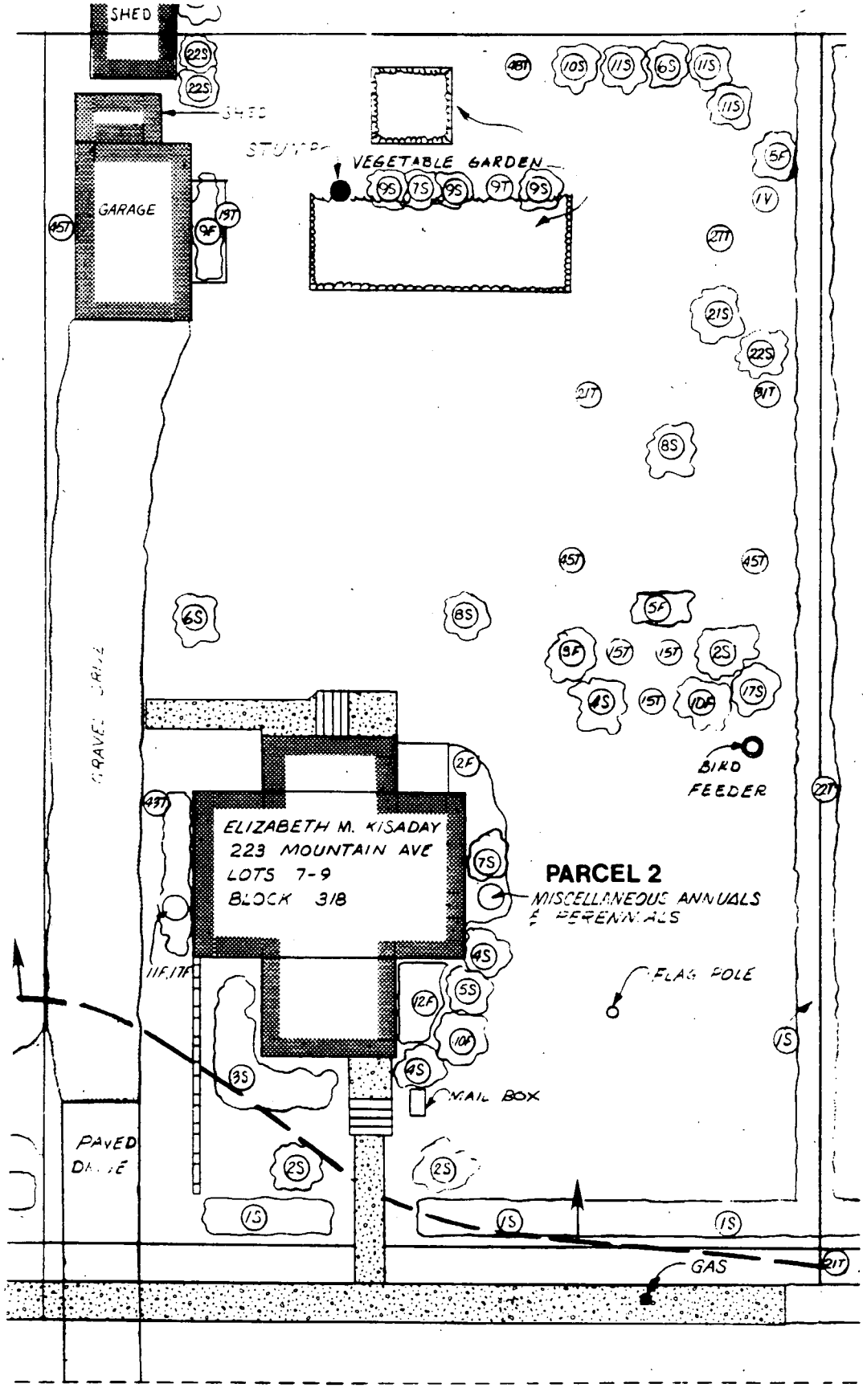
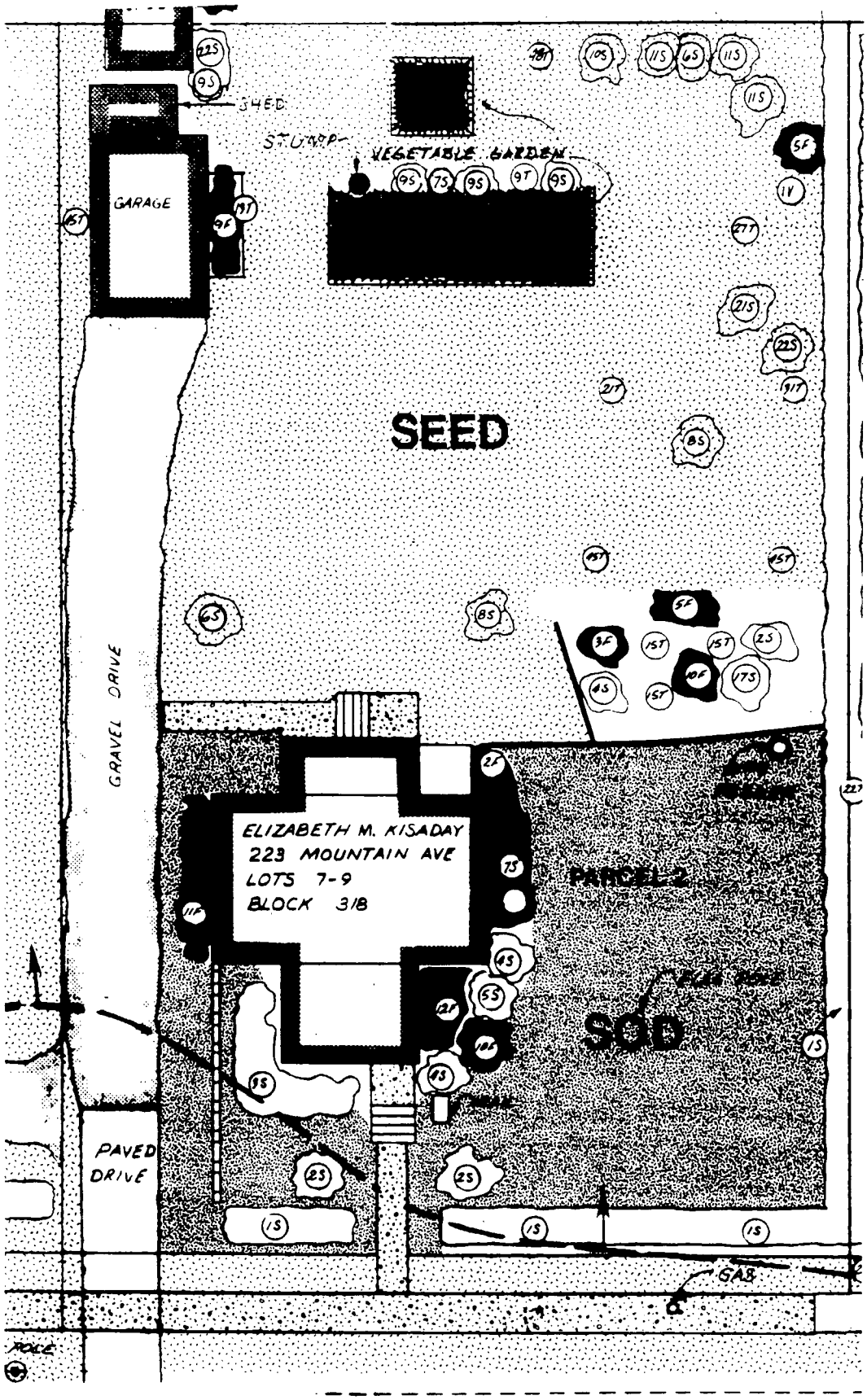


PARCEL MAP

ELIZABETH M. KISADAY
LOTS 7-9, BLOCK 318
BOROUGH OF MIDDLESEX

2



GRASS DESIGNATION MAP

ELIZABETH M. KISADAY
LOTS 7-9, BLOCK 318
BOROUGH OF MIDDLESEX

2

Elizabeth M. Kisaday
Parcel 2
Lots 7-9, Block 318
Borough of Middlesex

DESCRIPTION OF REMEDIAL ACTIONS

Recent surveys have shown that low level radioactive contamination exists on this property. To remove this contamination as part of the overall remedial action program, it will be necessary to remove some of the improvements as well. Structures such as the residence or garage will not be disturbed. The property will be physically restored as nearly as reasonably practical to the conditions existing at the start of the decontamination activities. Efforts will be made to minimize disruptions and inconvenience to the occupants. When initiated, the work will be carried through to completion.

On this property, it is anticipated that the following improvements will be affected:

1 - Lawns and grassy areas

2 - Trees, shrubs, and flowers

3 - Sidewalks

4 - Driveways

5 - Flagpole

6 - Rabbit Hutch

7 - Garden Areas

8 - Mail Box

It will be necessary to excavate contaminated soil, and

vegetation and some improvements within the proposed limits of cleanup as shown on the Parcel Map. The exact limits and depths will be determined at the time of excavation. The excavated areas will be filled with compacted backfill.

Lawns will be replaced with sod or topsoil as shown on the Grass Designation Map. Sod will be placed on four inches of topsoil. Areas planted with grass will receive six inches of topsoil.

Whenever possible, plantings will be replaced in kind, however, larger trees and shrubs will be replaced with as large a size as reasonable. Whenver possible, large mature plantings will not be removed. The feasibility of saving the plantings will be dependent on the size and type of planting as well as the depth of excavation. The final determination as to which plantings can be left will be made at the time of excavation. The garden area will be restored with twelve inches of topsoil.

Concrete replacement sidewalks will be four inches thick and will be placed on six inches of compacted gravel. Gravel driveways will be composed of eight inches of compacted gravel.

The existing flagpole and mail box will be removed and reinstalled upon completion of backfilling operations. The rabbit hutch will be temporarily stored and returned upon completion of the work.

All uncontaminated personal items on the property that are to be saved will be removed, stored and returned to the pro-

perty. Any of the owner's unwanted items on the property at the time of decontamination, will be disposed of by the contractors at the owner's option.

If the property owner desires any betterments to the existing improvements, these will be negotiated with the Department of Energy and will be included in the Special Provisions Section.

LAND OWNER
PACKAGE INVENTORY

OWNER

NAME: Elizabeth M. Kisaday

ADDRESS: 233 Mountain Avenue Middlesex, New Jersey

PROPERTY DESCRIPTION

LOT 7-9

BLOCK 318

BORO/~~TOWNSHIP~~ Middlesex

LEGAL DESCRIPTION: Lots 7-9, Block 318, Borough Middlesex

IMPROVEMENTS:

DWELLINGS: SQ. FT. Approximately 1036 ft^2 Main Level

LEVELS 2 plus Basement

CONST. Frame

GARAGE: SINGLE (Frame Construction)

DOUBLE

OTHER

STORAGE BUILDING:

PREFAB

OTHER 2 (Wood Construction)

IMPROVEMENTS TO DWELLINGS:

ADDITIONS

PORCHES Enclosed back porch, Open front porch

DECKS

PATIO

DRIVEWAYS: CONCRETE

PAVED Approximately 200 ft^2

GRAVEL Approximately 800 ft^2

UNIMPROVED

SIDEWALKS: CONCRETE Approximately 110 ft^2

PAVED

GRAVEL

STONE

BRICK

FENCES - GATES.

WOOD

CHAIN LINK

BARBED WIRE

OTHER

LANDSCAPING

LAWN GRASS SQ. FT. Seed Approximately 5000 ft^2 Sod Approx. 2400 ft^2

TREES 7T, 9T, 13T, 15T, 16T, 21T, 22T, 24T, 27T, 31T, 43T, 45T, 48T

SHRUBS 1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 21S, 22S, 23S

HERBACEOUS CATEGORY (FLOWERING) F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F17

FERNS 1

VINES 1

VEGETABLE GARDEN Approximately 350 ft^2 (Misc. Vegetables)

ROCK GARDEN

NOTE: ADDITIONAL INVENTORY OF TREES, SHRUBS, FERNS, VINES, AND HERBACEOUS CATEGORY ITEMS LISTED ON PAGE

MISCELLANEOUS PERSONAL PROPERTY ITEMS: 1-Bird feeder mounted on pipe, 1-flag pole, 1 mail box mounted on post, 4ft statue (religious), 1-wheel barrow, 3ftx5ft wooden bench, saw horse, 4 lengths of plastic pipe, Misc. pieces of scrap wood, small stack of firewood, wooden trellis, 2-garbage cans (30 gal), 1-lawn mower (push type), garden hose (rubber 75ft)

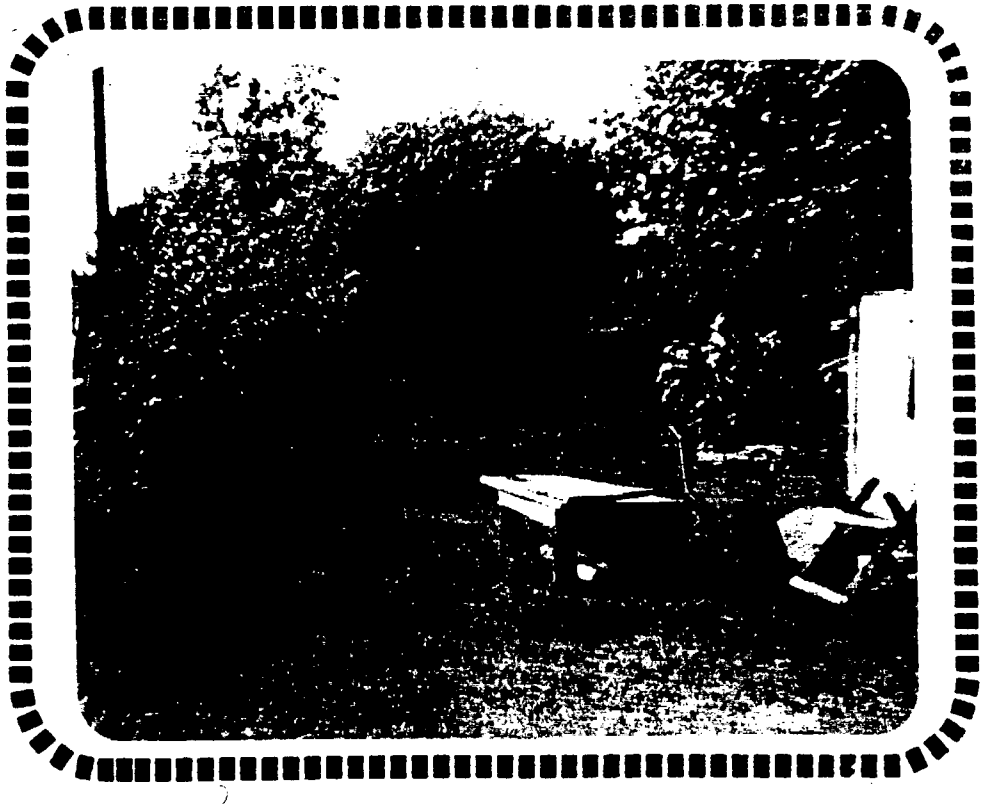
2

ELIZABETH M. KISADAY
223 MOUNTAIN AVE
LOTS 7-9, BLOCK 318
BOROUGH OF MIDDLESEX

N.W. Corner of Property (KISADAY)

Front of House (KISADAY)

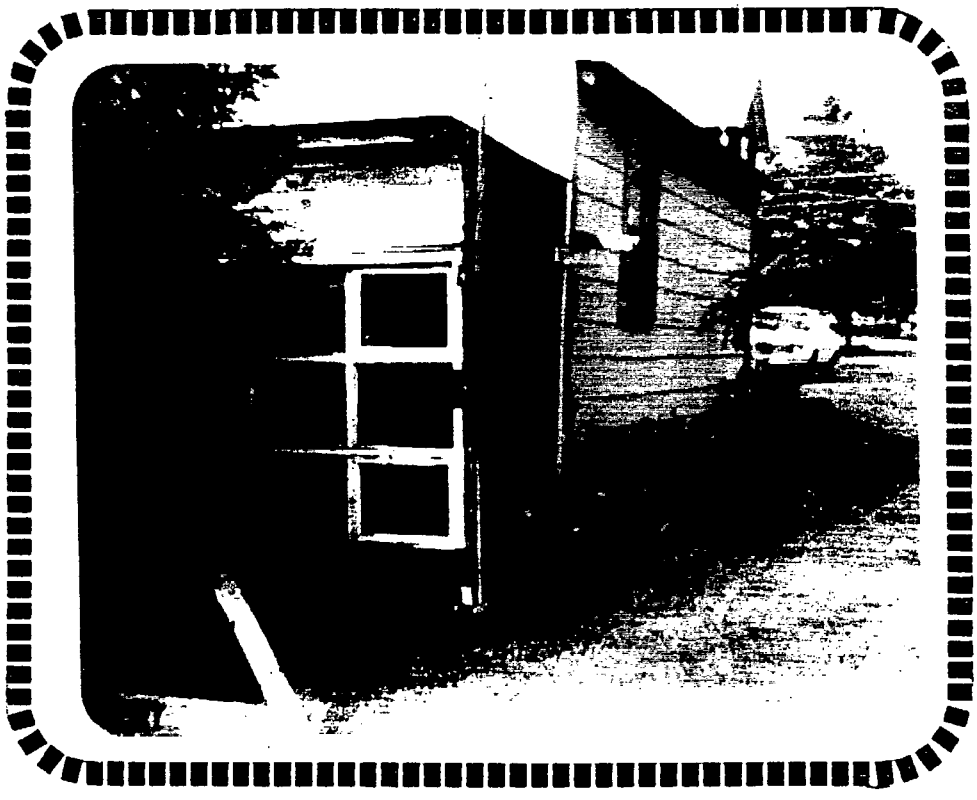
So. Side of House & Driveway (KISADAY)



Area Between USMC Base and KISADAY Property
(West)

No. Property Line (KISADAY)

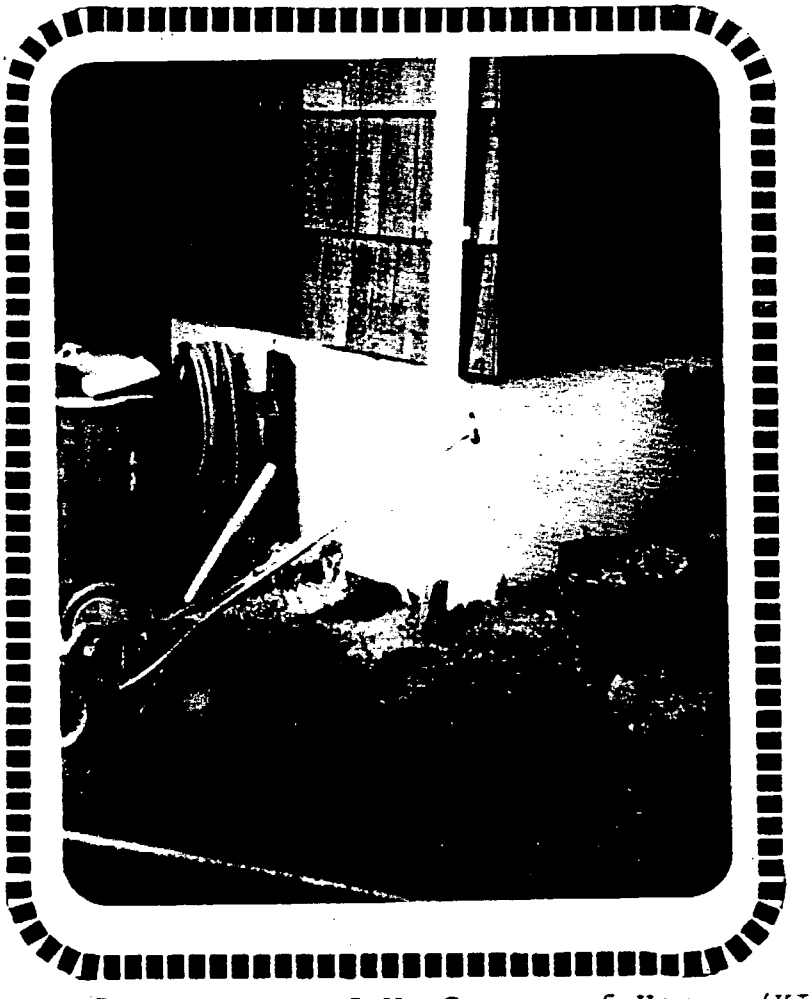
Storage Shed Behind Garage (KISADAY)



W. Side of Garage W/Shed (KISADAY)

So. Side of House & Driveway (KISADAY)

Rear (West) Side of House (KISADAY)



Downspout at S.W. Corner of House (KISADAY)

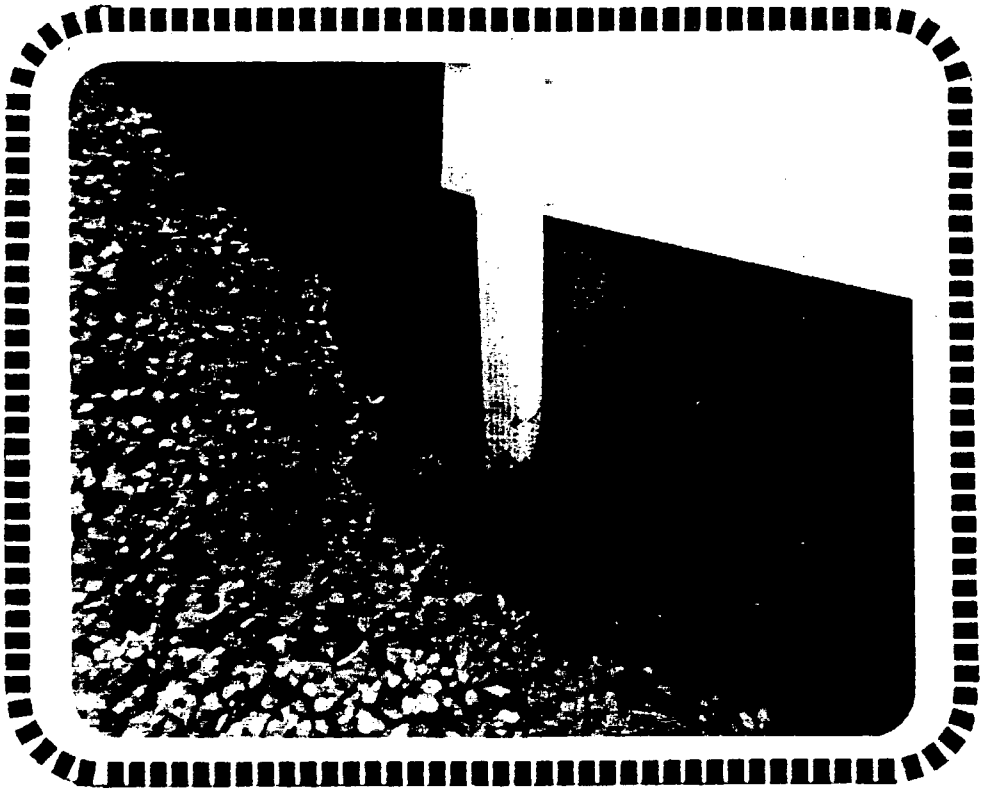
N.W. Corner and Rear (West) of House (KISADAY)

Downspout at N.W. Corner of House (KISADAY)

No. Side of House (KISADAY)

Front (E) and No. Side of House (KISADAY)

S.E. Corner of House W/Downspout (KISADAY)



Downspout at S.E. Corner of House (KISADAY)

Prepared for

United States Department of Energy

Formerly Utilized MED/AEC Sites Remedial Action Program

Middlesex Sampling Plant & Associated Properties

DESCRIPTION OF REMEDIAL ACTION

Property Owner

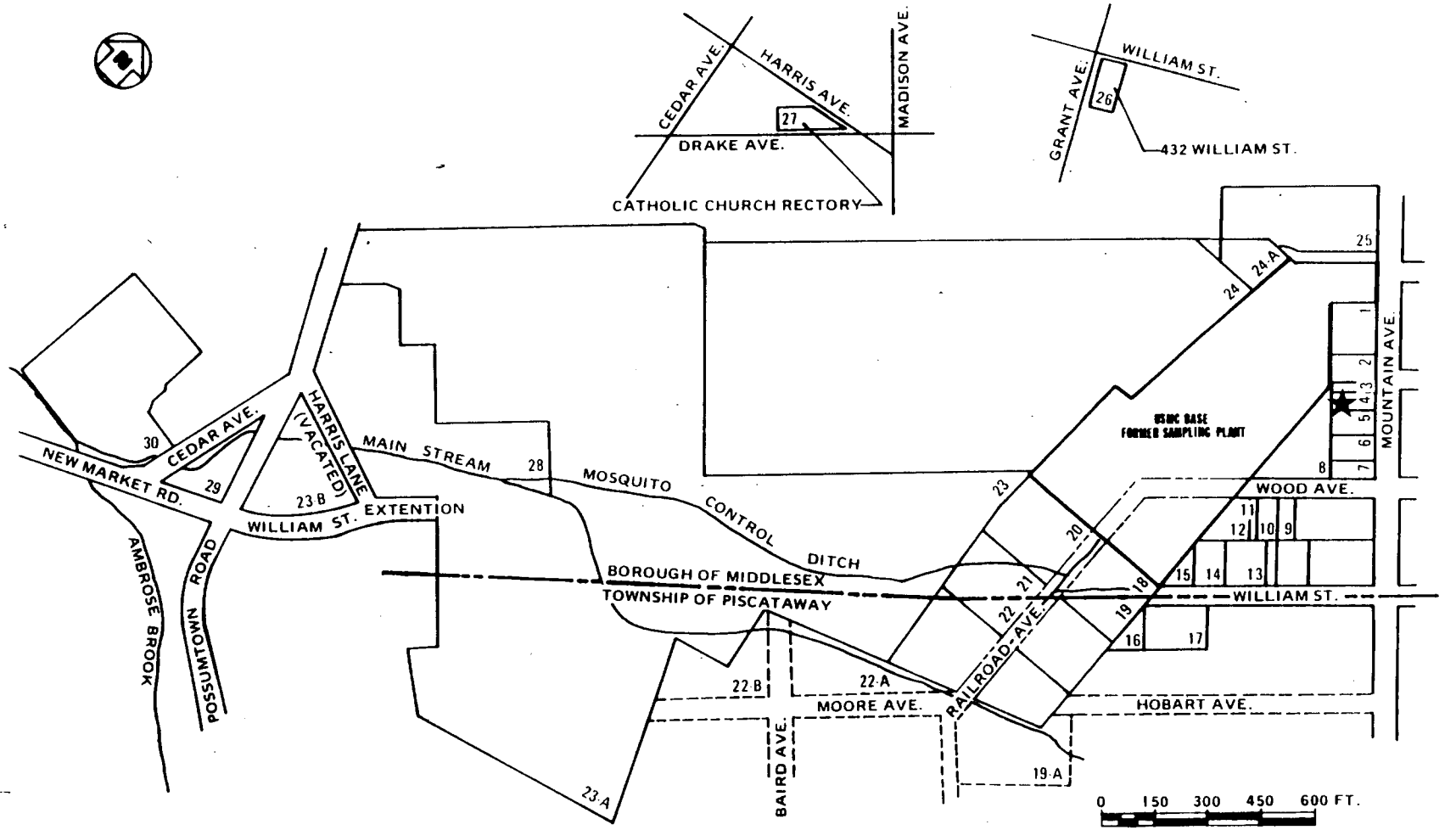
JOSEPH & MARY VOLGEY
LOTS 11-12, BLOCK 318
BOROUGH OF MIDDLESEX

4

April 1979

by
Ford, Bacon & Davis
375 Chipeta Way
Salt Lake City, Utah

45

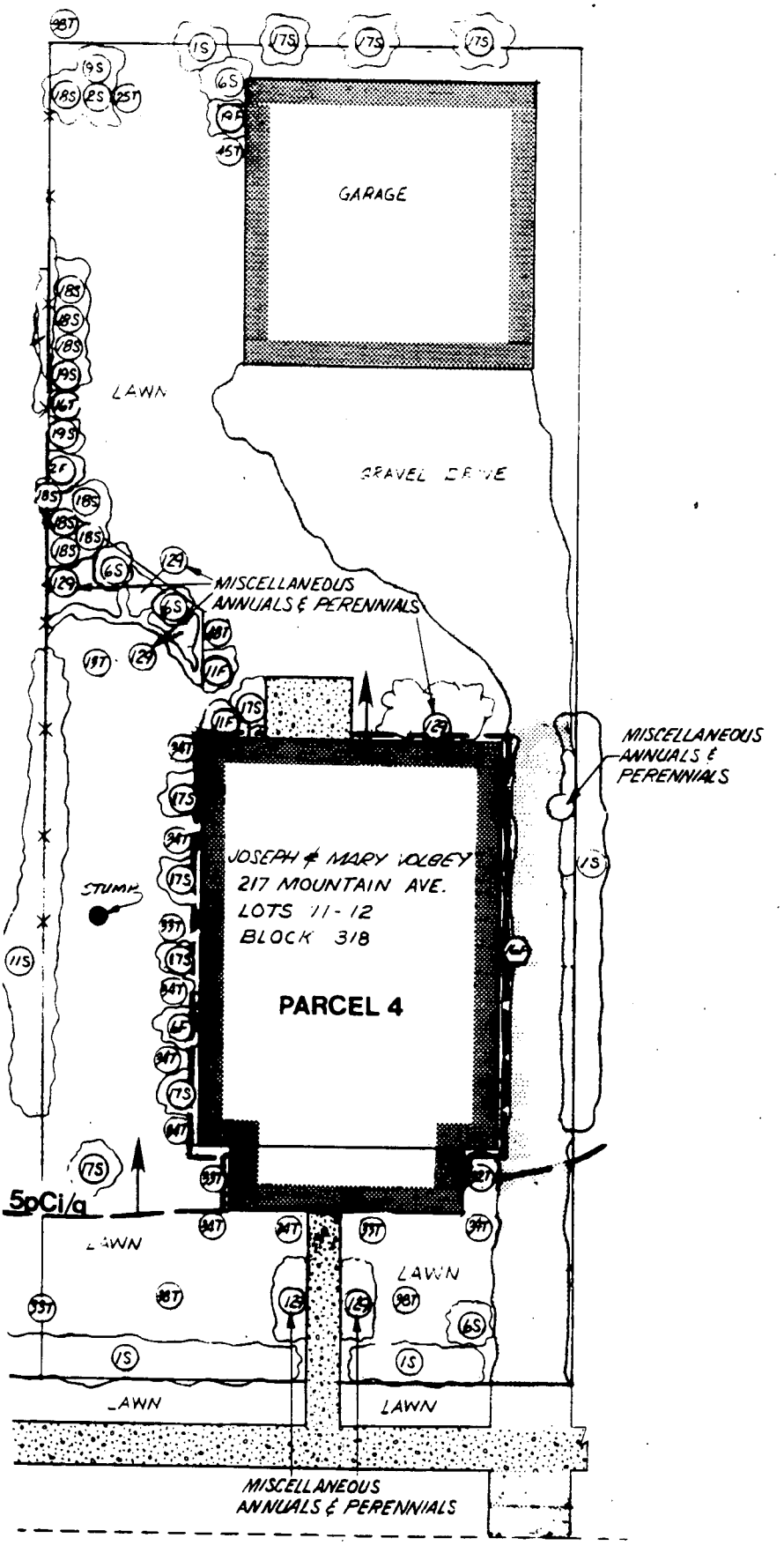


VICINITY MAP

★ **JOSEPH & MARY VOLGEY**
LOTS 11-12, BLOCK 318
BOROUGH OF MIDDLESEX

4

9h

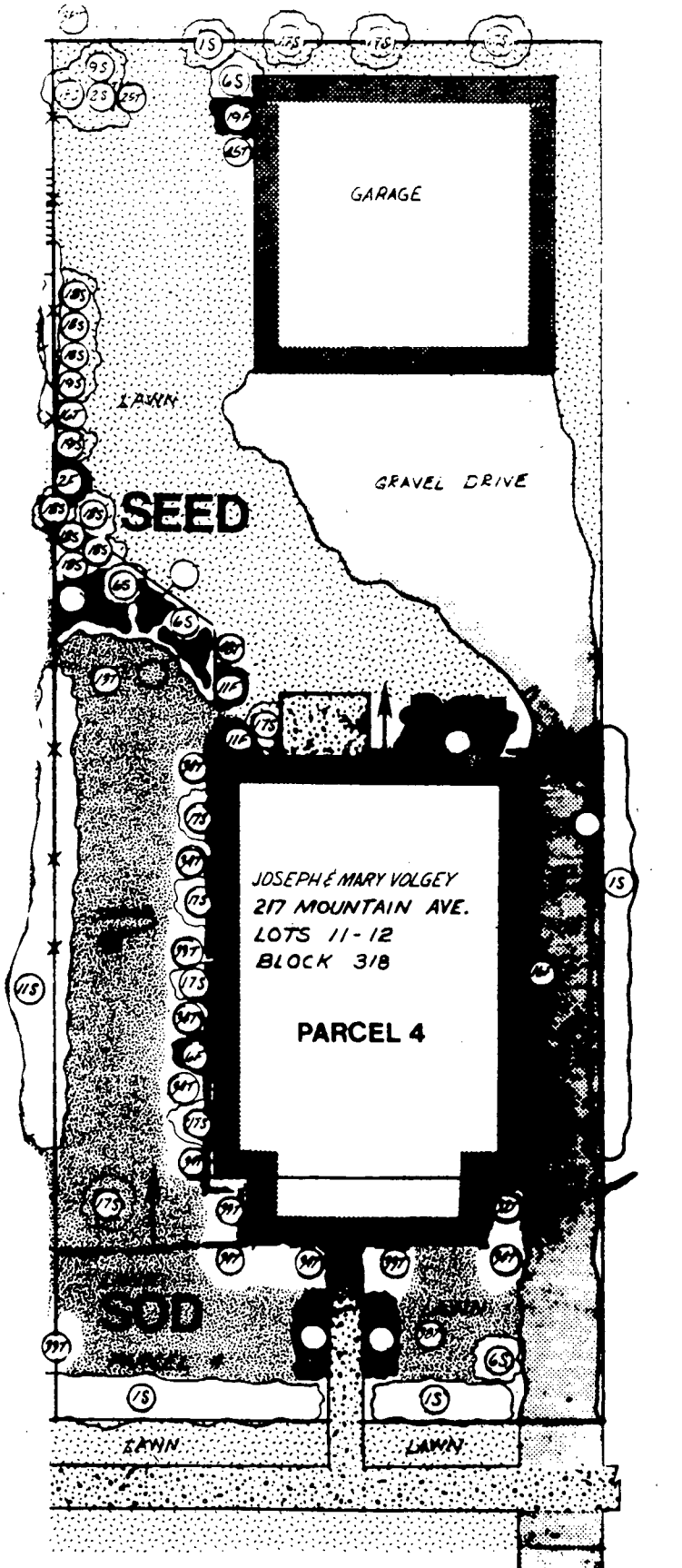


PARCEL MAP

JOSEPH & MARY VOLGEY
LOTS 11-12, BLOCK 318
BOROUGH OF MIDDLESEX

4

47



AREA WITHIN LIMITS OF DECONTAMINATION TO BE SEEDED

AREA WITHIN LIMITS OF DECONTAMINATION TO BE SODDED

GRASS DESIGNATION MAP

JOSEPH & MARY VOLGEY
LOTS 11-12, BLOCK 318
BOROUGH OF MIDDLESEX

4

Joseph & Mary Volgey
Parcel 4
Lots 11-12, Block 318
Borough of Middlesex

DESCRIPTION OF REMEDIAL ACTIONS

Recent surveys have shown that low level radioactive contamination exists on this property. To remove this contamination as part of the overall remedial action program, it will be necessary to remove some of the improvements as well. Structures such as the residence or garage will not be disturbed. The property will be physically restored as nearly as reasonably practical to the conditions existing at the start of the decontamination activities. Efforts will be made to minimize disruptions and inconvenience to the occupants. When initiated, the work will be carried through to completion.

On this property, it is anticipated that the following improvements will be affected:

1 - Lawns and grassy areas

2 - Trees, shurbs, and flowers

3 - Sidewalks

4 - Driveways

5 - Fences

It will be necessary to excavate contaminated soil, and vegetation and some improvements within the proposed limits of

cleanup as shown on the Parcel Map. The exact limits and depths will be determined at the time of excavation. The excavated areas will be filled with compacted backfill.

Lawns will be replaced with sod or topsoil as shown on the Grass Designation Map. Sod will be placed on four inches of topsoil. Areas planted with grass will receive six inches of topsoil.

Whenever possible, plantings will be replaced in kind, however, larger trees and shrubs will be replaced with as large a size as reasonable. Whenever possible, large mature plantings will not be removed. The feasibility of saving the plantings will be dependent on the size and type of planting as well as the depth of excavation. The final determination as to which plantings can be left will be made at the time of excavation.

Concrete replacement sidewalks will be four inches thick and will be placed on six inches of compacted gravel. Gravel driveways will be composed of eight inches of compacted gravel.

The existing fences will be removed and be replaced at the option of the property owner.

All uncontaminated personal items on the property that are to be saved will be removed, stored and returned to the property. Any of the owner's unwanted items on the property at the time of decontamination, will be disposed of by the contractors at the owner's option.

50

If the property owner desires any betterments to the existing improvements, these will be negotiated with the Department of Energy and will be included in the Special Provisions Section.

LAND OWNER
PACKAGE INVENTORY

OWNER

NAME: Joseph & Mary Volgey

ADDRESS: 217 Mountain Avenue

PROPERTY DESCRIPTION

LOT 11-12

BLOCK 318

BORO/TOWNSHIP Middlesex

LEGAL DESCRIPTION: Lots 11-12, Block 318, Borough of Middlesex

IMPROVEMENTS:

DWELLINGS:
- SQ. FT. Approximately 1065 ft^2
- LEVELS 1 plus Basement
- CONST. Frame Construction

GARAGE:
- SINGLE
- DOUBLE Block Construction
- OTHER

STORAGE BUILDING:
- PREFAB None
- OTHER

IMPROVEMENTS TO DWELLINGS:
- ADDITIONS None
- PORCHES Front and Rear Open Porches
- DECKS
- PATIO

DRIVEWAYS:
- CONCRETE
- PAVED
- GRAVEL Approximately 1260 ft^2
- UNIMPROVED

SIDEWALKS:
- CONCRETE Approximately 260 ft^2
- PAVED
- GRAVEL
- STONE
- BRICK

FENCES GATES

WOOD 30 lft

CHAIN LINK 100 lft

BARBED WIRE

OTHER

LANDSCAPING

LAWN GRASS SQ. FT. Seed: 2250 ft^2 Sod: 1250 ft^2

TREES 9T, 11T, 13T, 15T, 16T, 18T, 25T, 32T, 33T, 34T, 38T, 45T

SHRUBS 1S, 2S, 6S, 9S, 17S, 18S, 19S

HERBACEOUS CATEGORY (FLOWERING) 2F, 5F, 6F, 7F, 10F, 11F, 16F, 19F

FERNS None

VINES 2V

VEGETABLE GARDEN Approximately 200 ft^2

ROCK GARDEN None

NOTE: ADDITIONAL INVENTORY OF TREES, SHRUBS, FERNS, VINES, AND HERBACEOUS CATEGORY ITEMS LISTED ON PAGE

MISCELLANEOUS PERSONAL PROPERTY ITEMS: Mail box mounted on a post, clothes line, Approximately 8 sections of wooden fence (approx. 8ft sections), 2-55 gal drums 1-roll (undetermined length) chain link fence, 1-radiator (auto), 1 stack of misc. lengths of scrape wood, 1-1963 chevrolet-4dr brown w/white top, 1-wood dog house, several used tires, some mounted on rims, 1 late 1950 model chevrolet, and misc. auto parts, 2 wooden clothes line poles.

4

JOSEPH & MARY VOLGEY
217 MOUNTAIN AVE
LOTS 11-12, BLOCK 318
BOROUGH OF MIDDLESEX

54

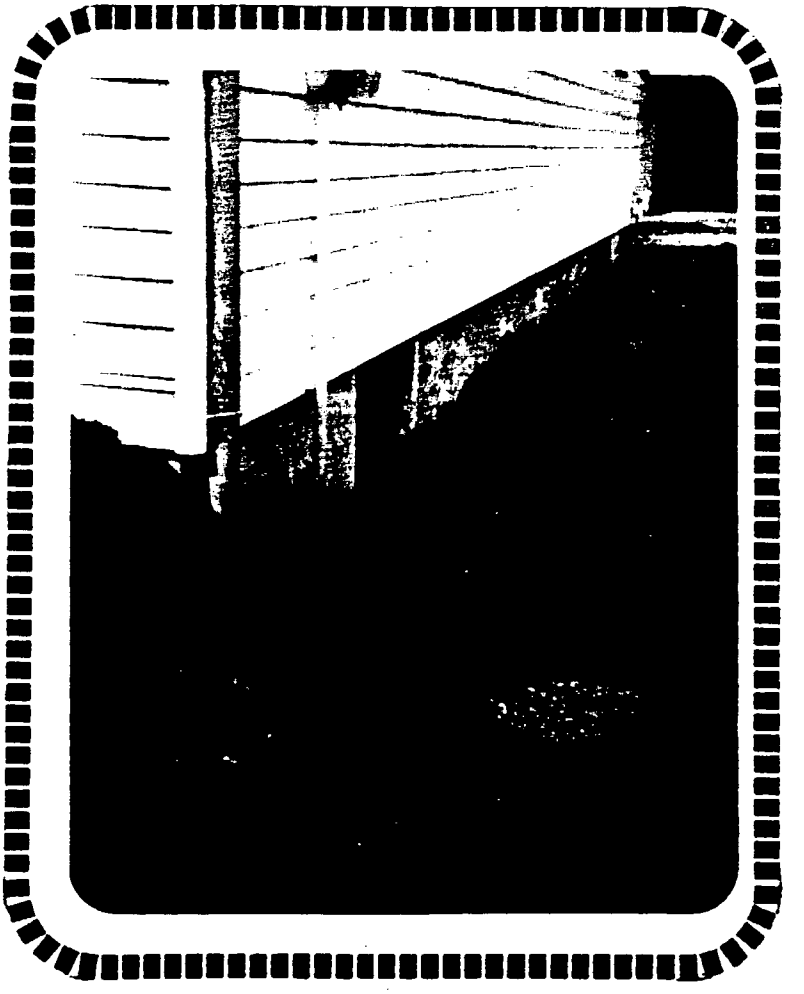
Rear (West) Side of Garage (VOLGEY)

Area between USMC Base and VOLGEY Property

N.W. Corner (Rear) of Garage (VOLGEY)

Vegetable Garden Located Behind Garage (VOLGEY)

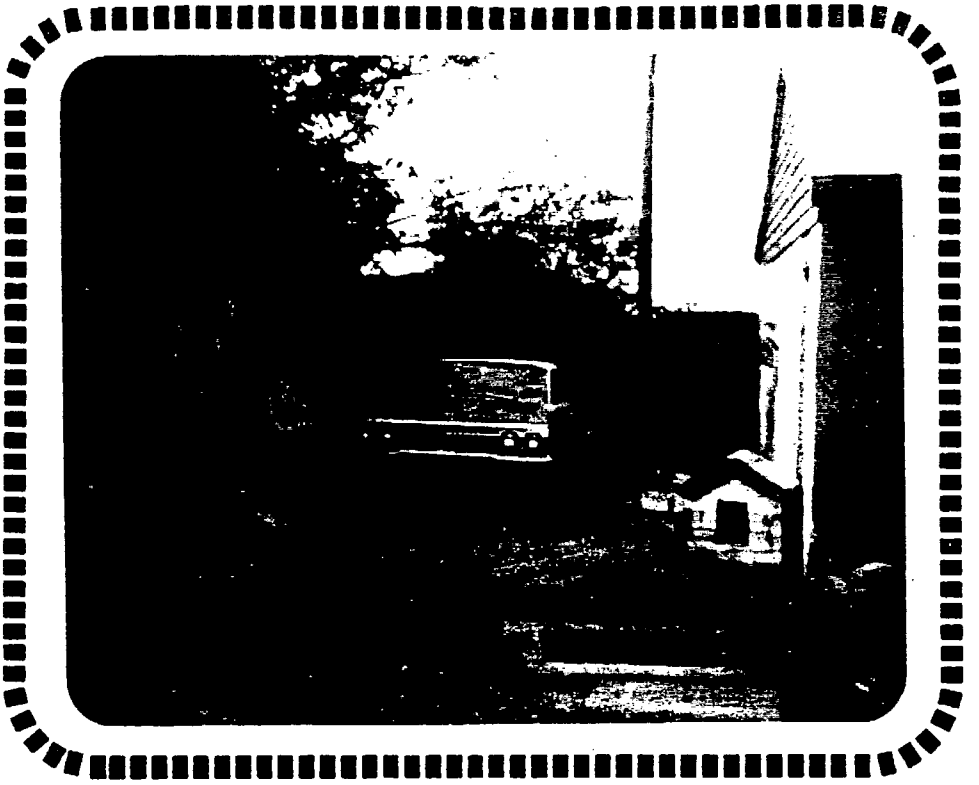
Rear (West) Side of House (VOLGEY)



Front (N.E.) Corner of House
Note Downspout (VOLGEY)

Area Between House and South Property Line
(VOLGEY)

Area Between USMC Base and VOLGEY Property

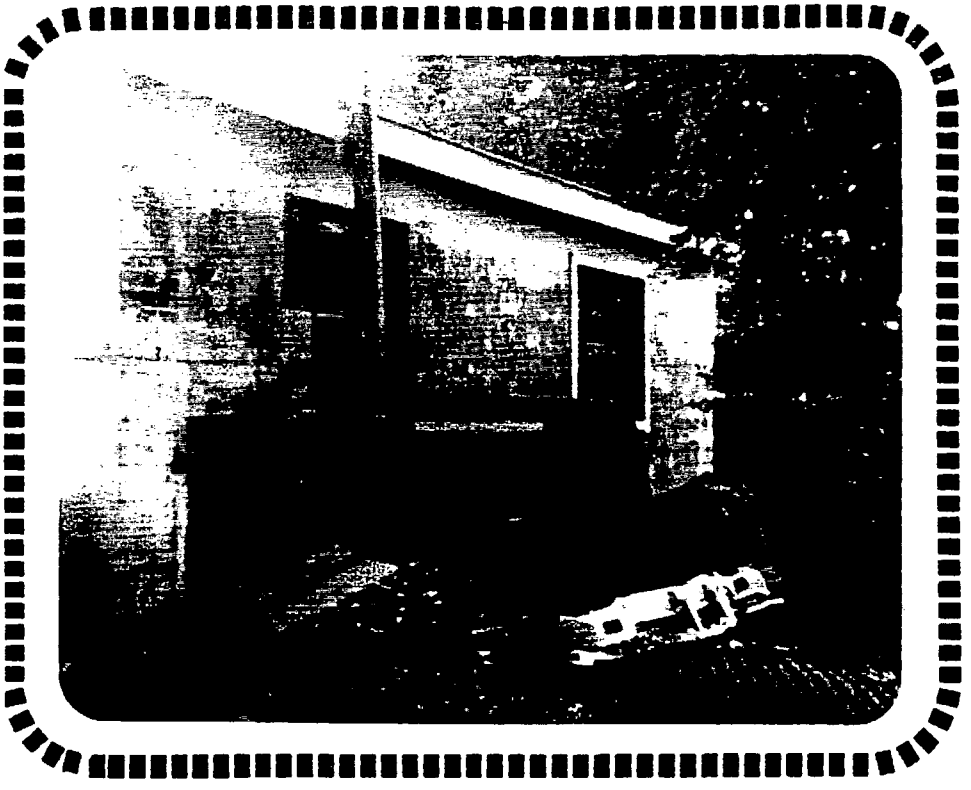


So. Side of Garage (VOLGEY)

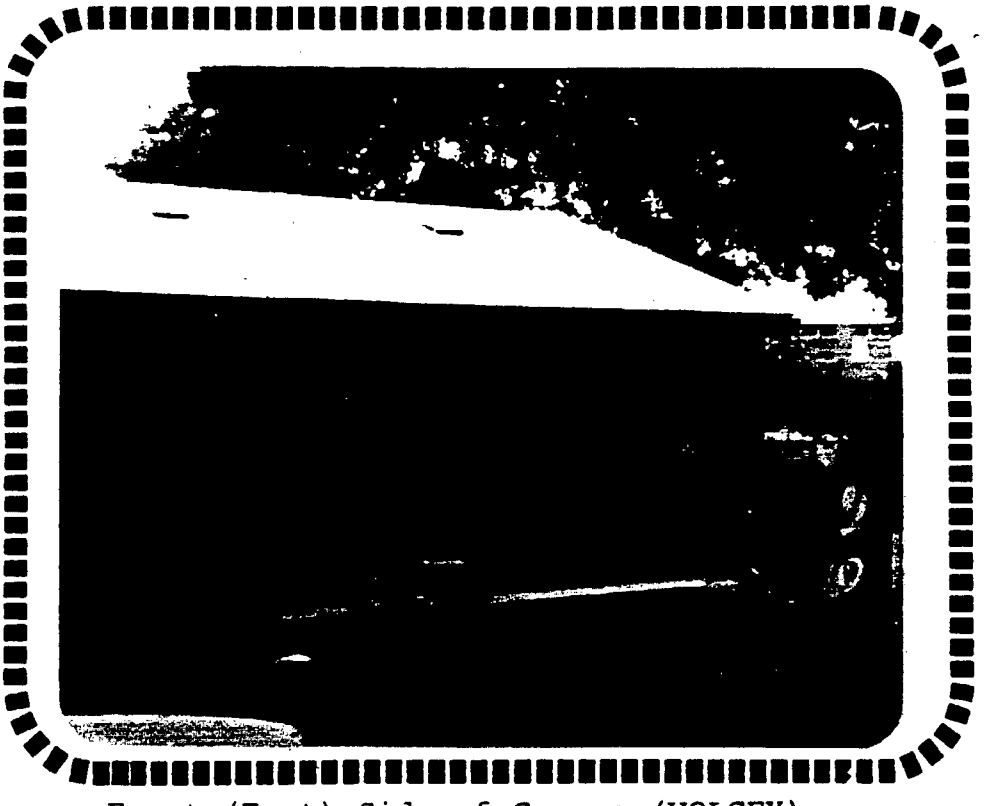
Rear (West) Side of House (VOLGEY)

N.W. Corner of House Note Drain Gutters and Downspouts (VOLGEY)

S.E. Corner of House (VOLGEY)

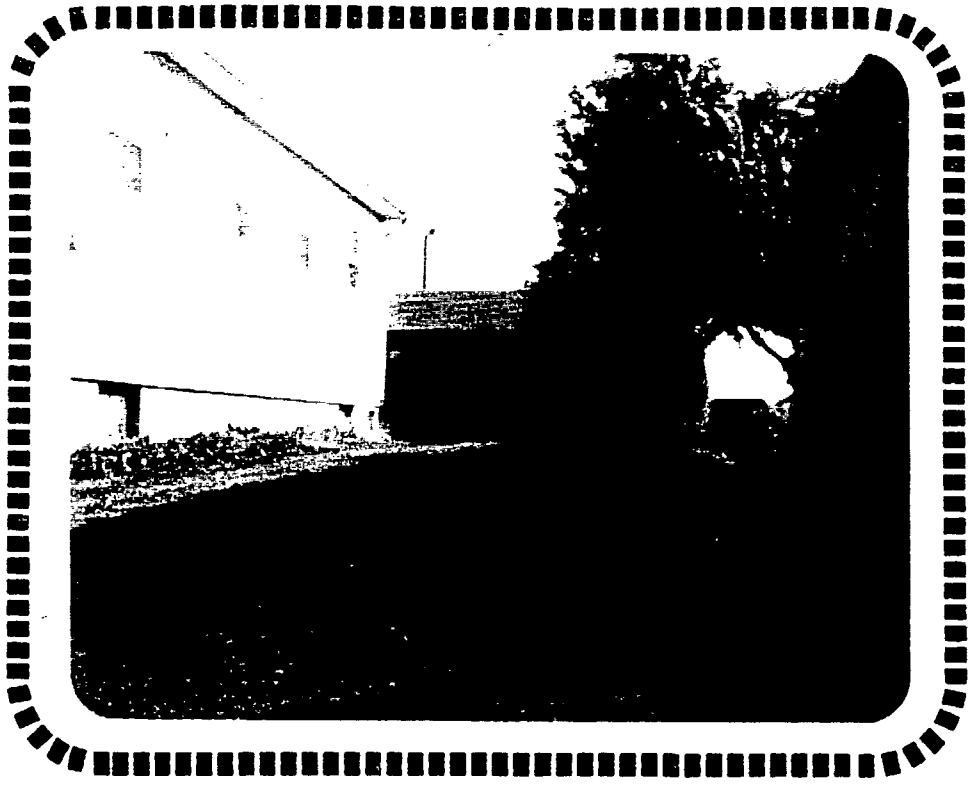


Rear (West) Side of Garage (VOLGEY)



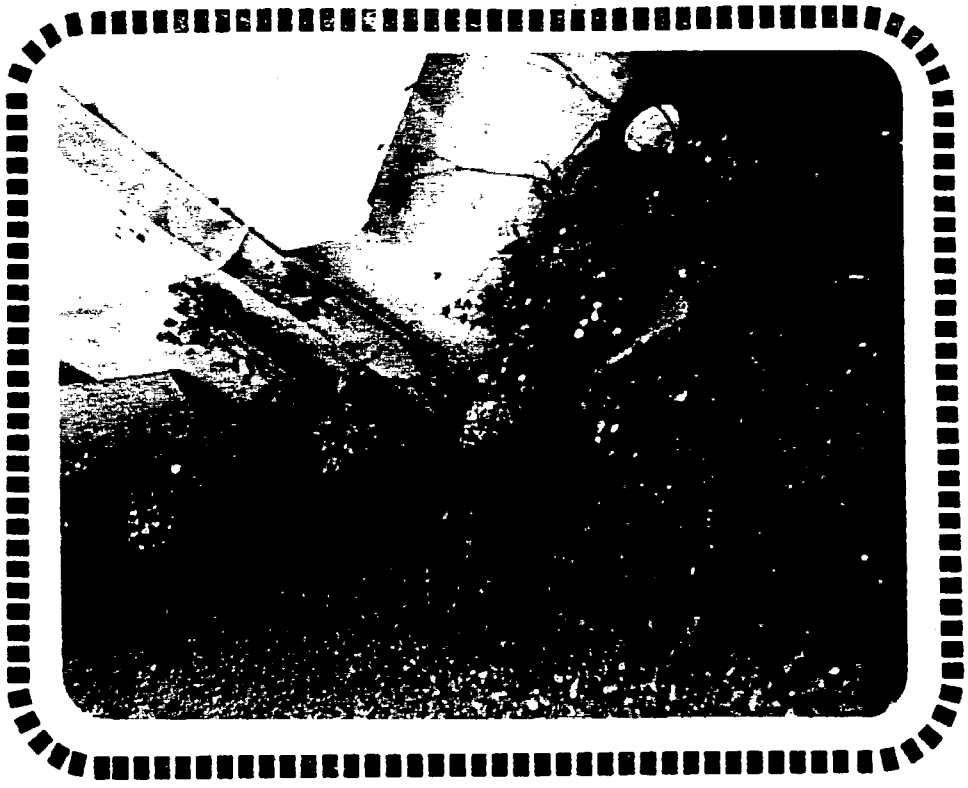
Front (East) Side of Garage (VOLGEY)

S.E. Corner of House at Downspout
(VOLGEY)



Gravel Drive on North Side of House (VOLGEY)

Front (East) Side of House (VOLGEY)



N.W. Corner of House Note Downspout (VOLGEY)

Prepared for

United States Department of Energy

Formerly Utilized MED/AEC Sites Remedial Action Program

Middlesex Sampling Plant & Associated Properties

DESCRIPTION OF REMEDIAL ACTION

Property Owner

SASHA GARCIA
LOTS 13-15, BLOCK 318
BOROUGH OF MIDDLESEX

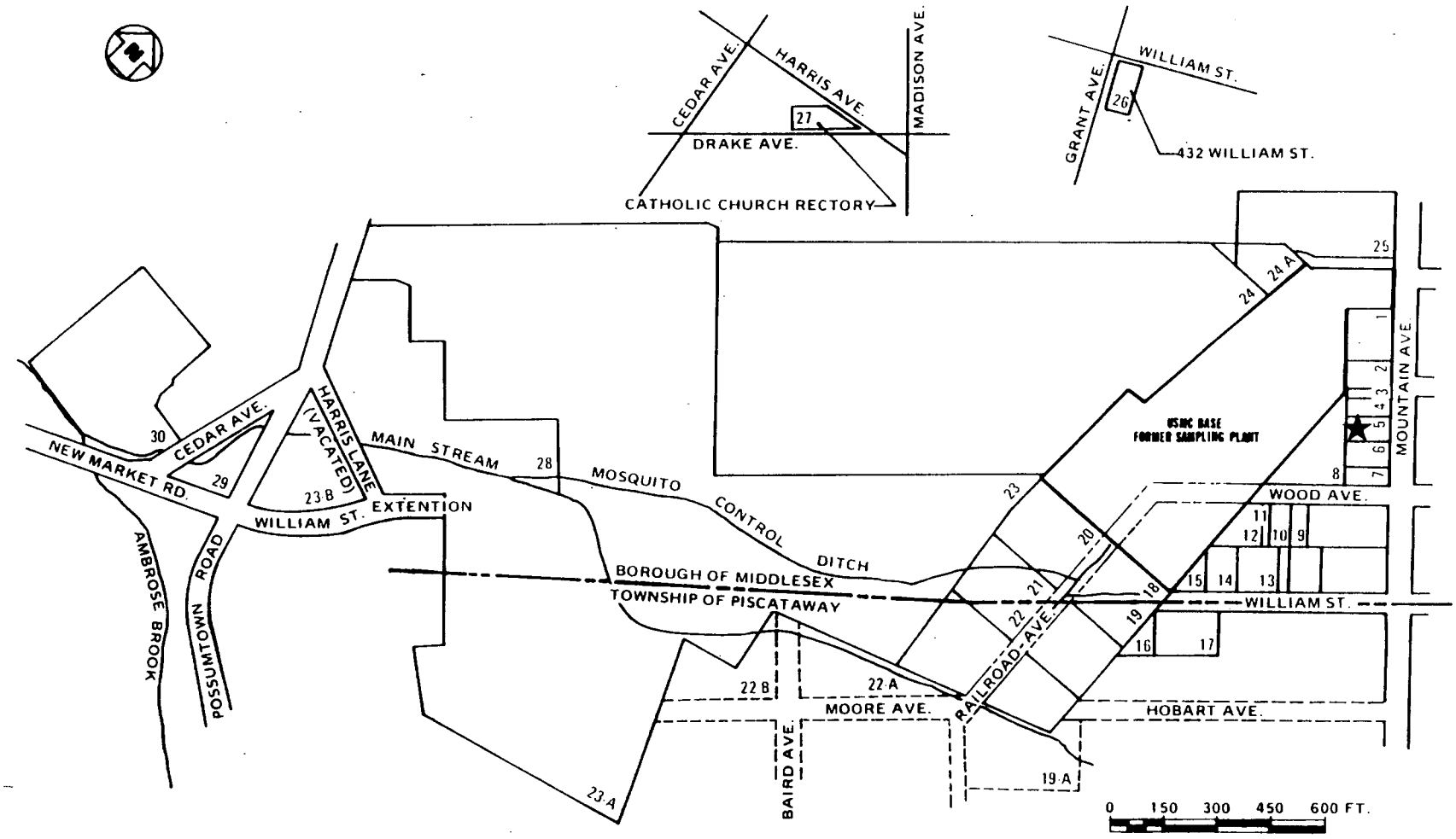
5

April 1979

by

Ford, Bacon & Davis
375 Chipeta Way
Salt Lake City, Utah

65

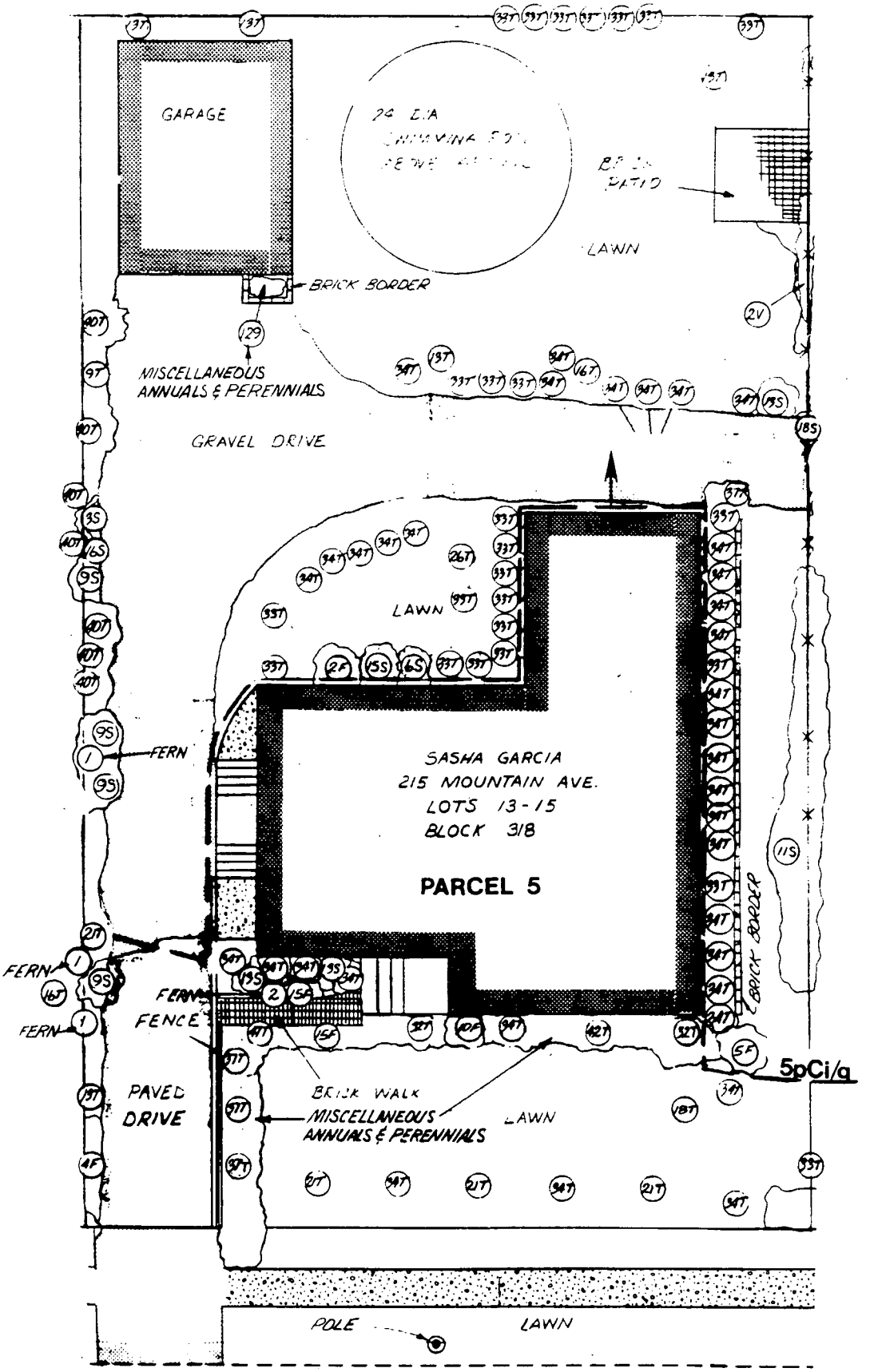


VICINITY MAP

★ **SASHA GARCIA**
LOTS 13-15, BLOCK 318
BOROUGH OF MIDDLESEX

5

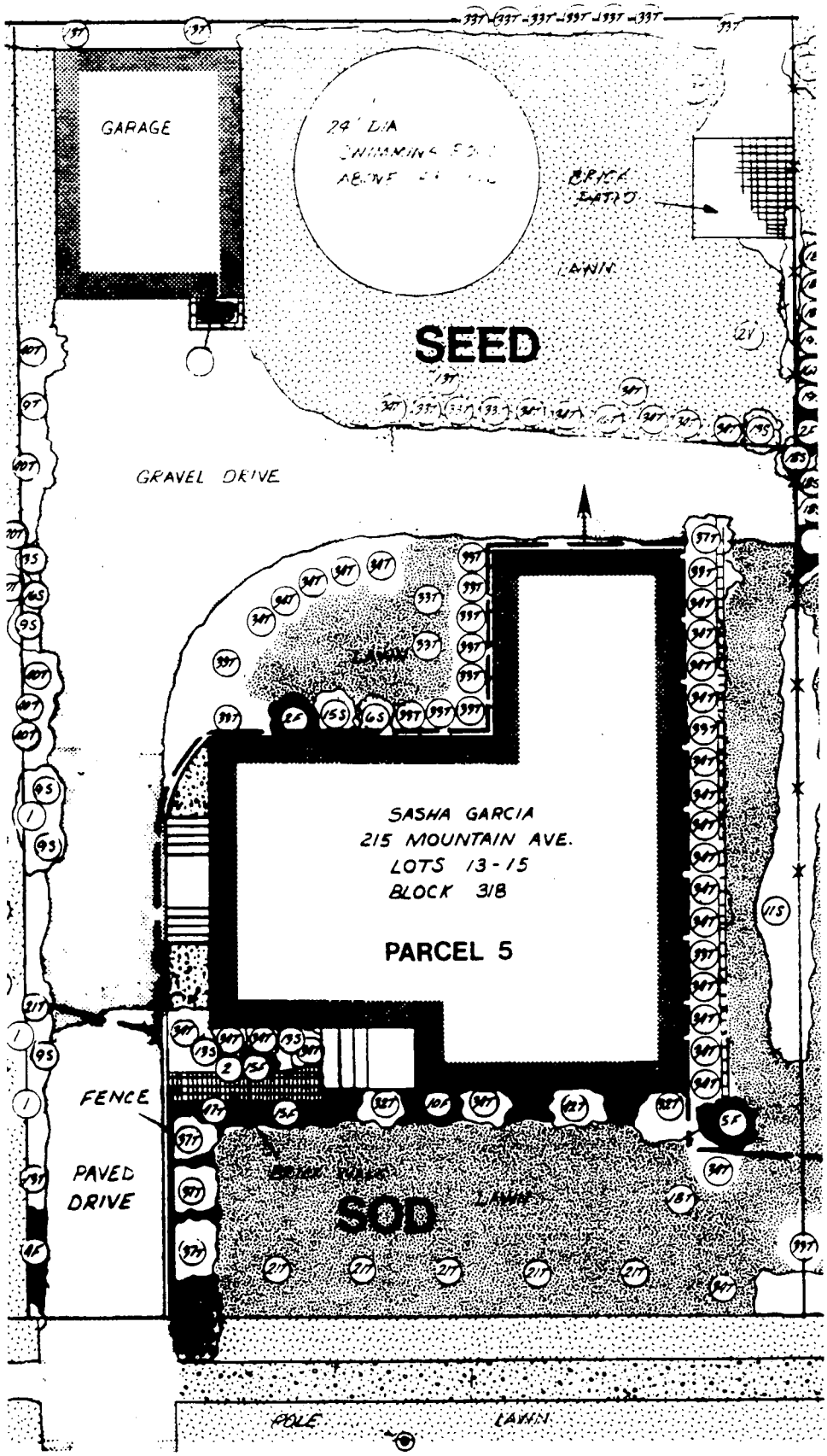
99



PARCEL MAP

SASHA GARCIA
LOTS 13-15, BLOCK 318
BOROUGH OF MIDDLESEX

5



AREA WITHIN LIMITS OF DECONTAMINATION TO BE SEEDED

AREA WITHIN LIMITS OF DECONTAMINATION TO BE SODDED

SASHA GARCIA
LOTS 13-15, BLOCK 318
BOROUGH OF MIDDLESEX

5

GRASS DESIGNATION MAP

Sasha Garcia
Parcel 5
Lots 13-15, Block 31B
Borough of Middlesex

DESCRIPTION OF REMEDIAL ACTIONS

Recent surveys have shown that low level radioactive contamination exists on this property. To remove this contamination as part of the overall remedial action program, it will be necessary to remove some of the improvements as well. Structures such as the residence or garage will not be disturbed. The property will be physically restored as nearly as reasonably practical to the conditions existing at the start of the decontamination activities. Efforts will be made to minimize disruptions and inconvenience to the occupants. When initiated, the work will be carried through to completion.

On this property, it is anticipated that the following improvements will be affected:

1 - Lawns and grassy areas

2 - Trees, shrubs, and flowers

3 - Brick borders

4 - Driveways

5 - Brick patio

6 - Fences

7 - Swimming pool

It will be necessary to excavate contaminated soil, and vegetation and some improvements within the proposed limits

of cleanup as shown on the Parcel Map. The exact limits and depths will be determined at the time of excavation. The excavated areas will be filled with compacted backfill.

Lawns will be replaced with sod or topsoil as shown on the Grass Designation Map. Sod will be placed on four inches of topsoil. Areas planted with grass will receive six inches of topsoil.

Whenever possible, plantings will be replaced in kind; however, larger trees and shrubs will be replaced with as large a size as reasonable. Whenever possible, large mature plantings will not be removed. The feasibility of saving the plantings will be dependent on the size and type of planting as well as the depth of excavation. The final determination as to which plantings can be left will be made at the time of excavation.

The brick border walls will be removed and replaced. The small brick patio will be removed and replaced. Gravel driveways will be composed of eight inches of compacted gravel.

The existing fence on the north property line will be removed and be replaced at the option of the property owner.

The above ground swimming pool will be dismantled and removed prior to the start of excavation. It will be reassembled after the completion of backfilling operations. Arrangements for the removal and replacement of the swimming pool and appurtenances will meet with the owners approval.

All uncontaminated personal items on the property that are to be saved will be removed, stored and returned to the property. Any of the owner's unwanted items on the property at the time of decontamination, will be disposed of by the contractors at the owner's option.

If the property owner desires any betterments to the existing improvements, these will be negotiated with the Department of Energy and will be included in the Special Provisions Section.

LAND OWNER
PACKAGE INVENTORY

OWNER

NAME: Sasha Garcia

ADDRESS: 215 Mountain Avenue

PROPERTY DESCRIPTION

LOT 13-15

BLOCK 318

BORO/TOWNSHIP Middlesex

LEGAL DESCRIPTION: Lot 13-15, block 318, Borough of Middlesex

IMPROVEMENTS:

DWELLINGS:
- SQ. FT. Approximately 1950 ft^2
- LEVELS 1 (basement possible)
- CONST.

GARAGE:
- SINGLE
- DOUBLE Block Construction
- OTHER

STORAGE BUILDING:
- PREFAB None
- OTHER

IMPROVEMENTS TO DWELLINGS:
- ADDITIONS
- PORCHES Front & rear open porches
- DECKS
- PATIO Approximately 100 ft^2 (brick construction)

DRIVEWAYS:
- CONCRETE
- PAVED Approximately 310 ft^2
- GRAVEL Approximately 1900 ft^2
- UNIMPROVED

SIDEWALKS:
- CONCRETE Approximately 400 ft^2
- PAVED
- GRAVEL
- STONE
- BRICK Approximately 45 ft^2

FENCES - GATES

WOOD None

CHAIN LINK

BARBED WIRE

OTHER

LANDSCAPING

LAWN GRASS SQ. FT. Seed: Approximately 1900 ft^2 Sod: Approx. 2240 ft^2

TREES 6T, 9T, 10T, 13T, 16T, 18T, 19T, 21T, 26T, 28T, 32T, 33T, 34T, 37T, 40T, 42T, 47T

SHRUBS 2S, 3S, 6S, 9S, 11S, 13S, 15S

HERBACEOUS CATEGORY (FLOWERING) F2, F4, F5, F10, F15

FERNS 1 Fern Fern-2

VINES 1V, 2V

VEGETABLE GARDEN None

ROCK GARDEN None

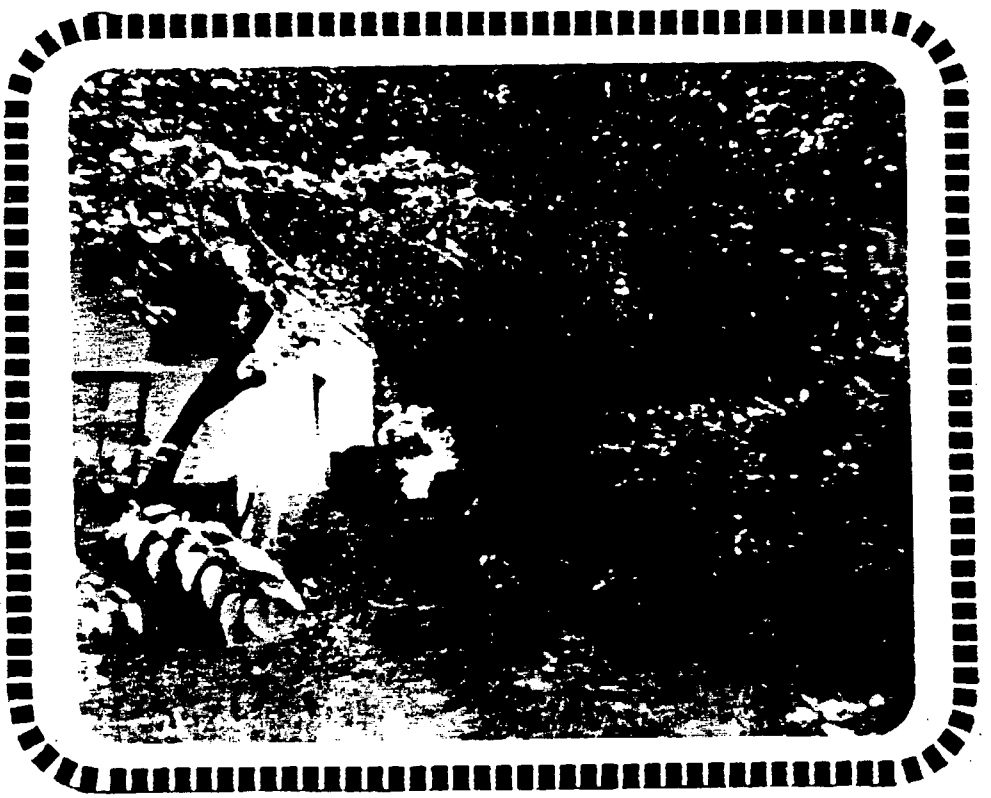
NOTE: ADDITIONAL INVENTORY OF TREES, SHRUBS, FERNS, VINES, AND HERBACEOUS CATEGORY ITEMS LISTED ON PAGE

MISCELLANEOUS PERSONAL PROPERTY ITEMS: 24' Dia. above ground swimming pool, 3-(30 gal) garbage cans, 1-lg hvy. equip-rubber tire (used), ladder (wood), wood window frame, misc. wooden boxes, 1-garden hose (rubber) 50 ft, old bath tub, canvas tarp, several metal folding chairs

5

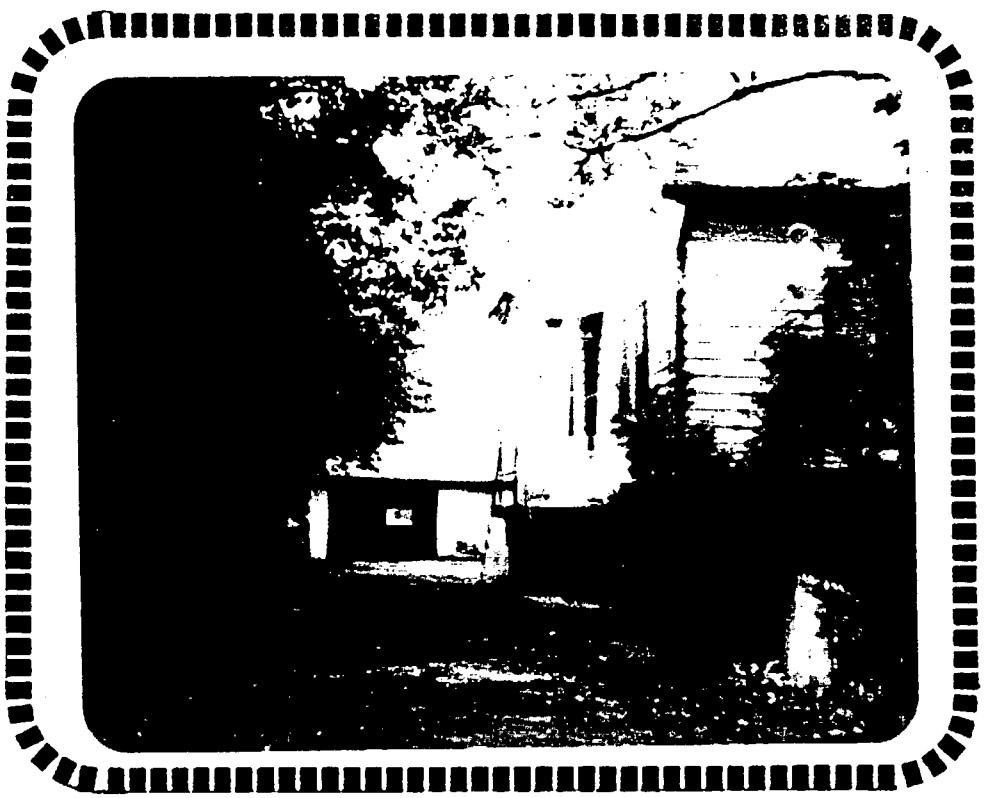
SASHA GARCIA
215 MOUNTAIN AVE
LOTS 13-15, BLOCK 318
BOROUGH OF MIDDLESEX

N.E. Corner of Property (GARCIA)



West (Rear) & So. Side of Garage

North Side of House (GARCIA)



South Side of House and Drive (GARCIA)

South Side of Garage (GARCIA)

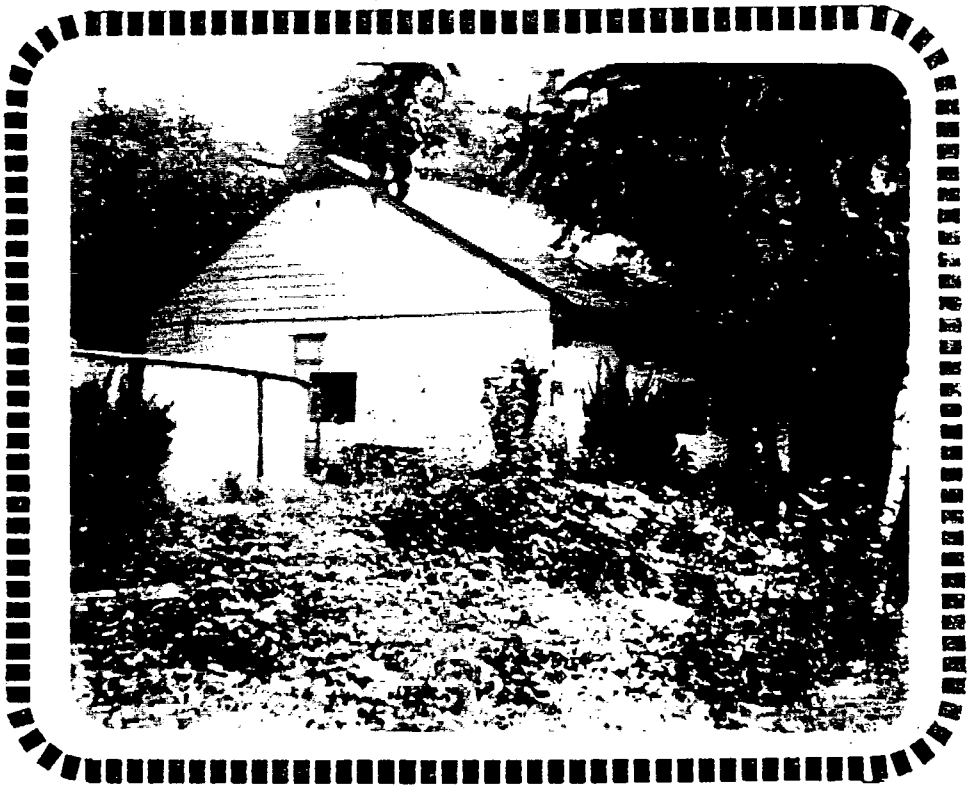
Area Between USMC Base and (GARCIA) Property

Area Between USMC Base and (GARCIA) Property

Area Between USMC Base and (GARCIA) Property

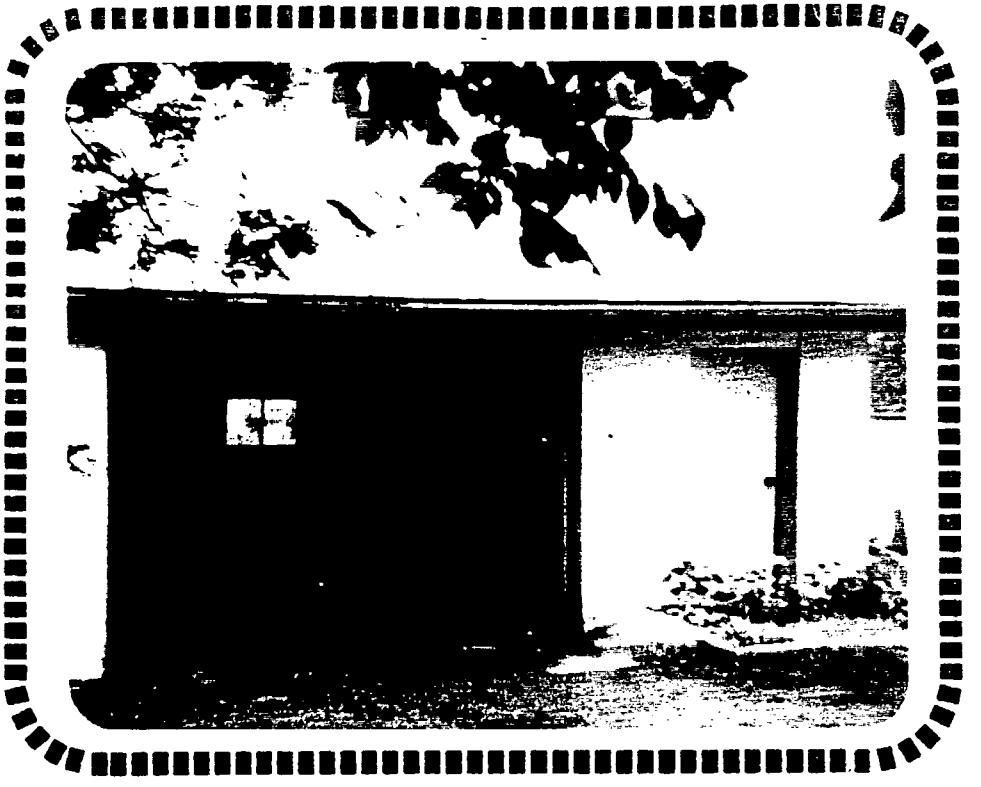
79

Rear (West) Side of Property (GARCIA)



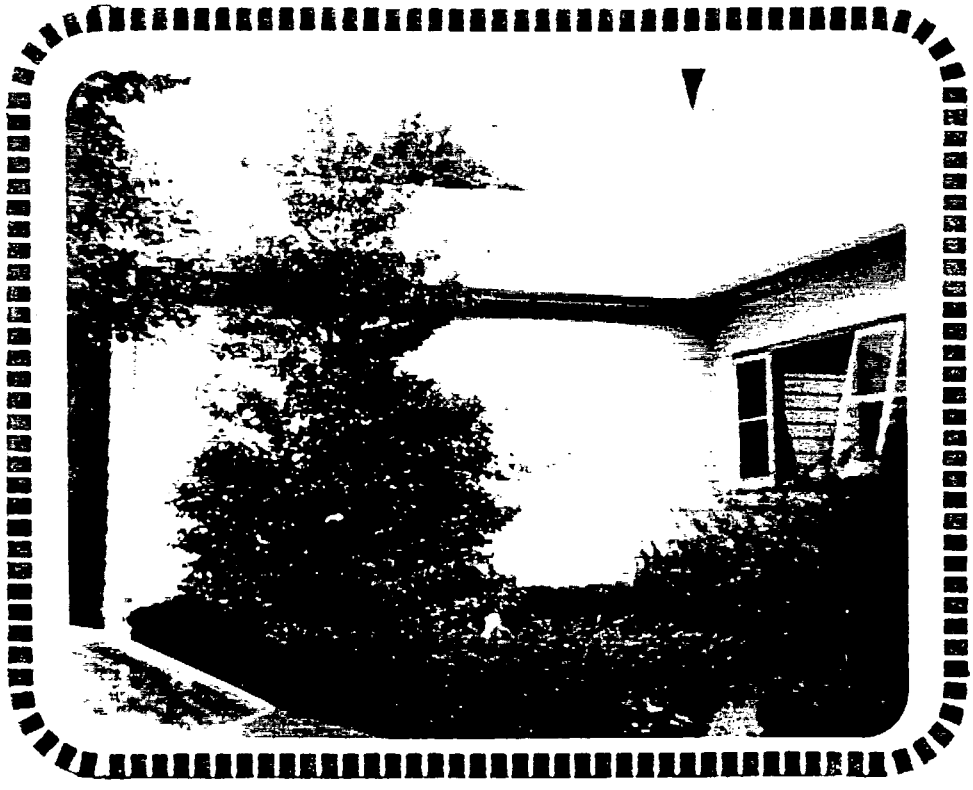
Swimming Pool and North Side of Garage (GARCIA)

North Drip Line of Garage (GARCIA)

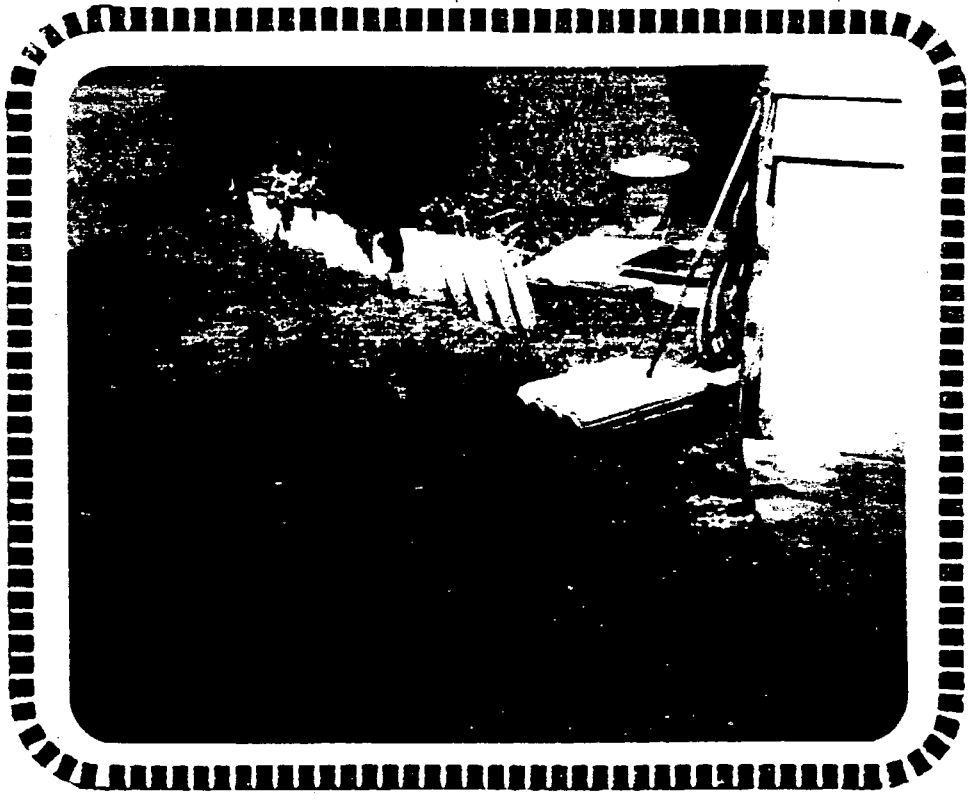


Front (East) Side of Garage (GARCIA)

Rear (West) Side of House (GARCIA)



Rear (West) Side of House (GARCIA)



S.W. Corner of House Showing Downspout
(GARCIA)

Downspout at S.W. Corner of House
(GARCIA)

Downspout at N.W. Corner of House

Downspout at S.E. Corner of House
(GARCIA)

N.E. Corner of House (GARCIA)

Prepared for

United States Department of Energy

Formerly Utilized MED/AEC Sites Remedial Action Program

Middlesex Sampling Plant & Associated Properties

DESCRIPTION OF REMEDIAL ACTION

Property Owner

RICHARD AND JOHANN SMITH
LOTS 16-18, BLOCK 318
BOROUGH OF MIDDLESEX

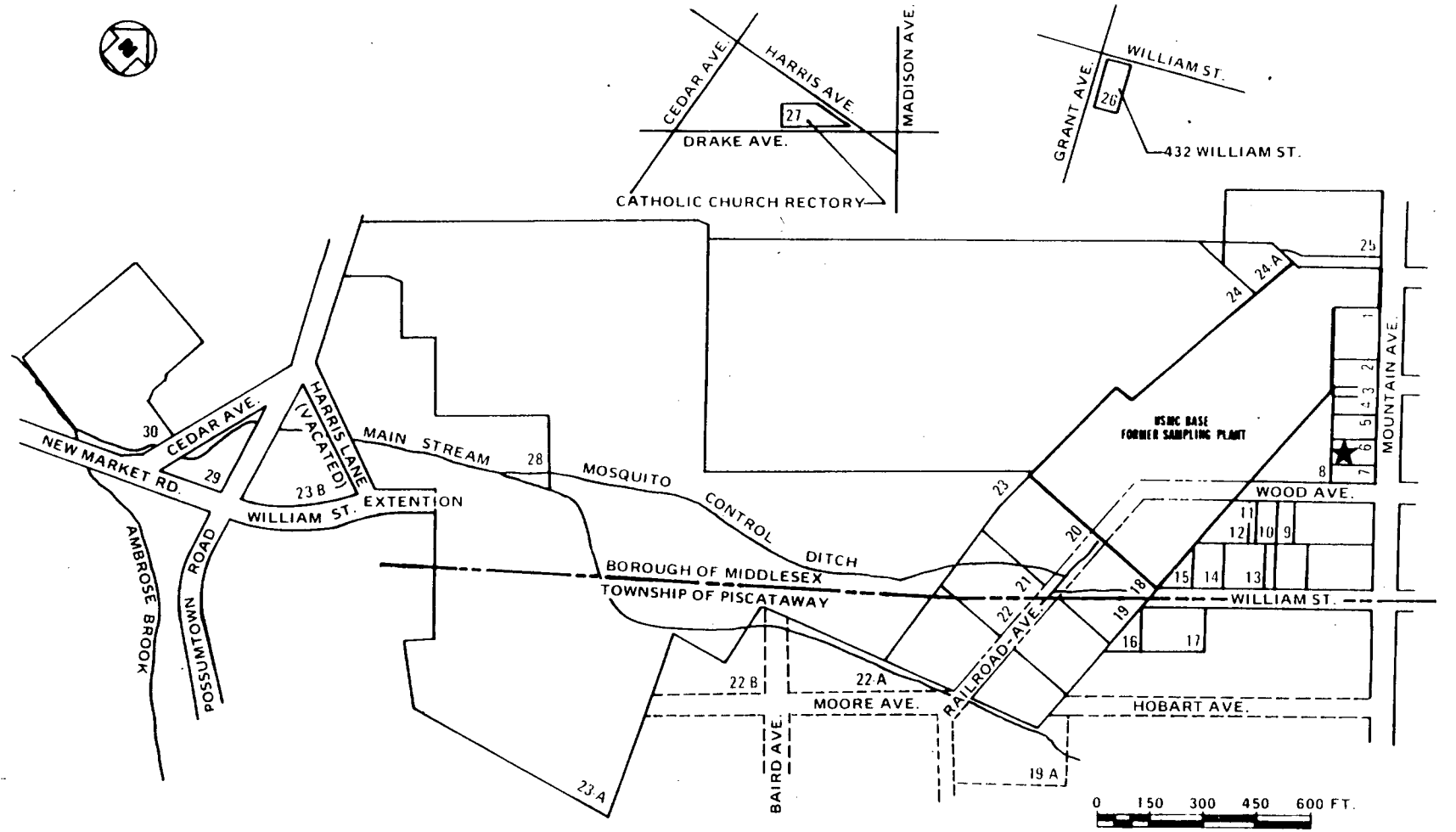
6

April 1979

by

Ford, Bacon & Davis
375 Chipeta Way
Salt Lake City, Utah

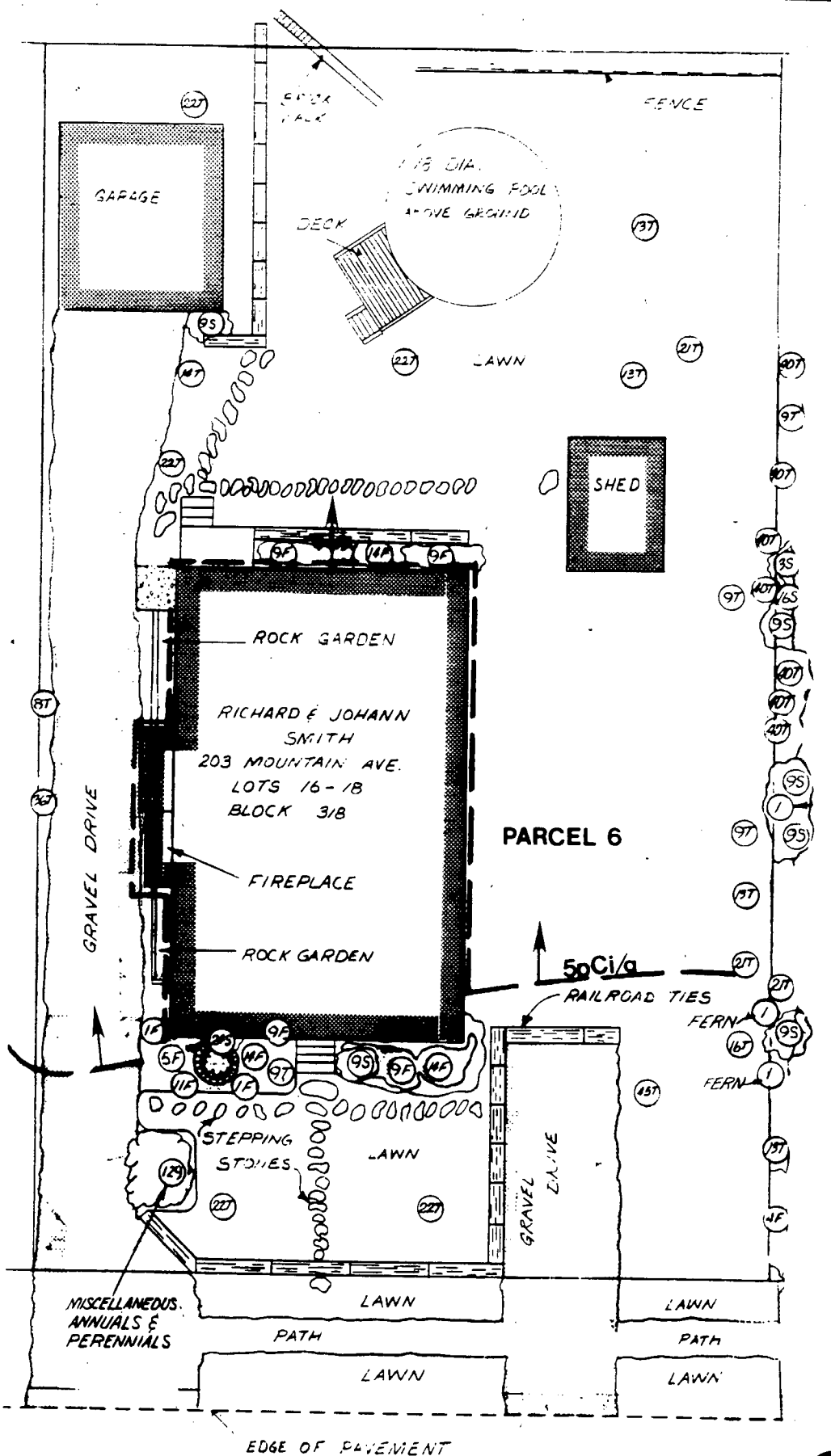
86



VICINITY MAP

★ **RICHARD & JOHANN SMITH**
LOTS 16-18, BLOCK 318
BOROUGH OF MIDDLESEX

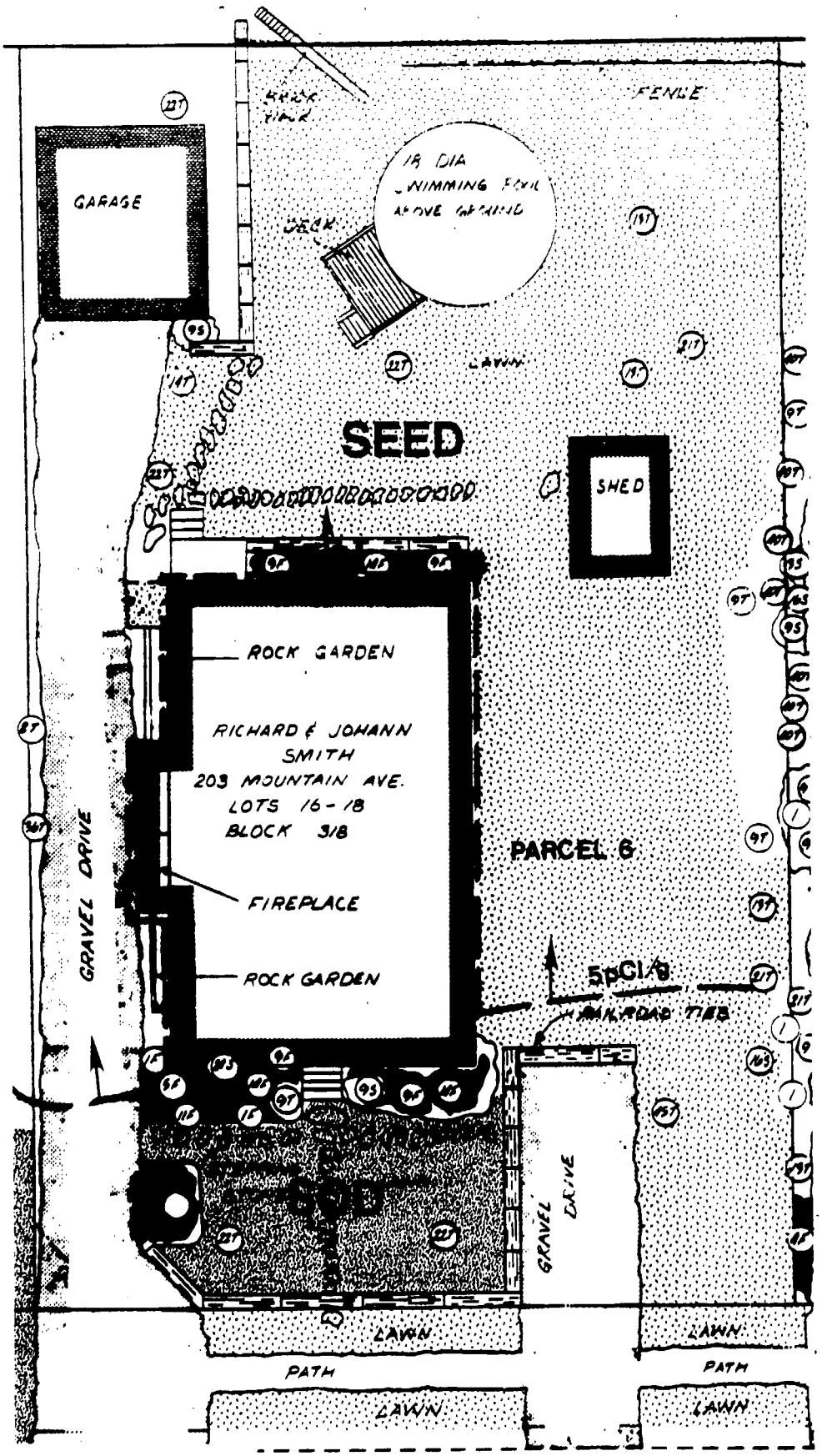
6



PARCEL MAP

RICHARD & JOHANN SMITH
LOTS 16-18, BLOCK 318
BOROUGH OF MIDDLESEX

6



AREA WITHIN LIMITS OF DECONTAMINATION TO BE SEEDED

AREA WITHIN LIMITS OF DECONTAMINATION TO BE SODDED

GRASS DESIGNATION MAP

RICHARD & JOHANN SMITH
LOTS 16-18, BLOCK 318
BOROUGH OF MIDDLESEX

6

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Richard & Johann Smith
Parcel 6
Lots 16-18, Block 318
Borough of Middlesex

DESCRIPTION OF REMEDIAL ACTIONS

Recent surveys have shown that low level radioactive contamination exists on this property. To remove this contamination as part of the overall remedial action program, it will be necessary to remove some of the improvements as well. Structures such as the residence or garage will not be disturbed. The property will be physically restored as nearly as reasonably practical to the conditions existing at the start of the decontamination activities. Efforts will be made to minimize disruptions and inconvenience to the occupants. When initiated, the work will be carried through to completion.

On this property, it is anticipated that the following improvements will be affected.

1 - Lawns and grassy areas

2 - Trees, shrubs, and flowers

3 - Stepping stones

4 - Driveways

5 - Railroad tie border wall

6 - Utility shed

7 - Fences

8 - Swimming pool

It will be necessary to excavate contaminated soil, and

vegetation and some improvements within the proposed limits of cleanup as shown on the Parcel Map. The exact limits and depths will be determined at the time of excavation. The excavated areas will be filled with compacted backfill.

Lawns will be replaced with sod or topsoil as shown on the Grass Designation Map. Sod will be placed on four inches of topsoil. Areas planted with grass will receive six inches of topsoil.

Whenever possible, plantings will be replaced in kind; however, larger trees and shrubs will be replaced with as large a size as reasonable. Whenever possible, large mature plantings will not be removed. The feasibility of saving the plantings will be dependent on the size and type of planting as well as the depth of excavation. The final determination as to which plantings can be left will be made at the time of excavation.

The stepping stones at the rear of the property will be removed and replaced. The gravel driveways will be composed of eight inches of compacted gravel.

The existing railroad tie border walls will be removed and reinstalled upon completion of backfilling operations. The existing fence at the back of the property will be removed and be replaced at the option of the property owner. The utility shed will be removed and stored temporarily, it will be replaced upon completion of backfilling operations.

The above ground swimming pool will be dismantled and

removed prior to the start of excavation. It will be reassembled after the completion of backfilling operations. Arrangements for the removal and replacement of the swimming pool will meet with the owners approval.

All uncontaminated personal items on the property that are to be saved will be removed, stored and returned to the property. Any of the owner's unwanted items on the property at the time of decontamination, will be disposed of the contractors at the owner's option.

If the property owner desires any betterments to the existing improvements, these will be negotiated with the Department of Energy and will be included in the Special Provisions Section.

LAND OWNER
PACKAGE INVENTORY

OWNER

NAME: Richard & Johann Smith

ADDRESS: 203 Mountain Avenue, Middlesex, New Jersey

PROPERTY DESCRIPTION

LOT 16-18

BLOCK 318

BORO/TOWNSHIP Middlesex

LEGAL DESCRIPTION: lot 16-18, Block 318, Borough of Middlesex

IMPROVEMENTS:

DWELLINGS: SQ. FT. Approximately 1440 ft (Main Level)

LEVELS 1 plus Basement

CONST. Frame Construction

GARAGE: SINGLE Frame Construction

DOUBLE

OTHER

STORAGE BUILDING:

PREFAB 10' x 14' metal

OTHER

IMPROVEMENTS TO DWELLINGS:

ADDITIONS

PORCHES Front and rear open porches

DECKS 6' x 10' Redwood deck attached to swimming pool

PATIO

DRIVEWAYS: CONCRETE

PAVED

GRAVEL Approximately 1800 ft^2

UNIMPROVED

SIDEWALKS: CONCRETE

PAVED

GRAVEL

STONE 110 lf of stepping stones

BRICK

FENCES GATES

WOOD Approximately 40 lf

CHAIN LINK

BARBED WIRE

OTHER

LANDSCAPING

LAWN GRASS SQ. FT. Seed: Approx. 5120 ft^2 Sod: Approx. 700 ft^2

TREES 8T, 9T, 13T, 14T, 16T, 21T, 22T, 36T, 45T

SHRUBS 9S, 24S

HERBACEOUS CATEGORY (FLOWERING) 1F, 5F, 9F, 11F, 13F, 14F

FERNS None

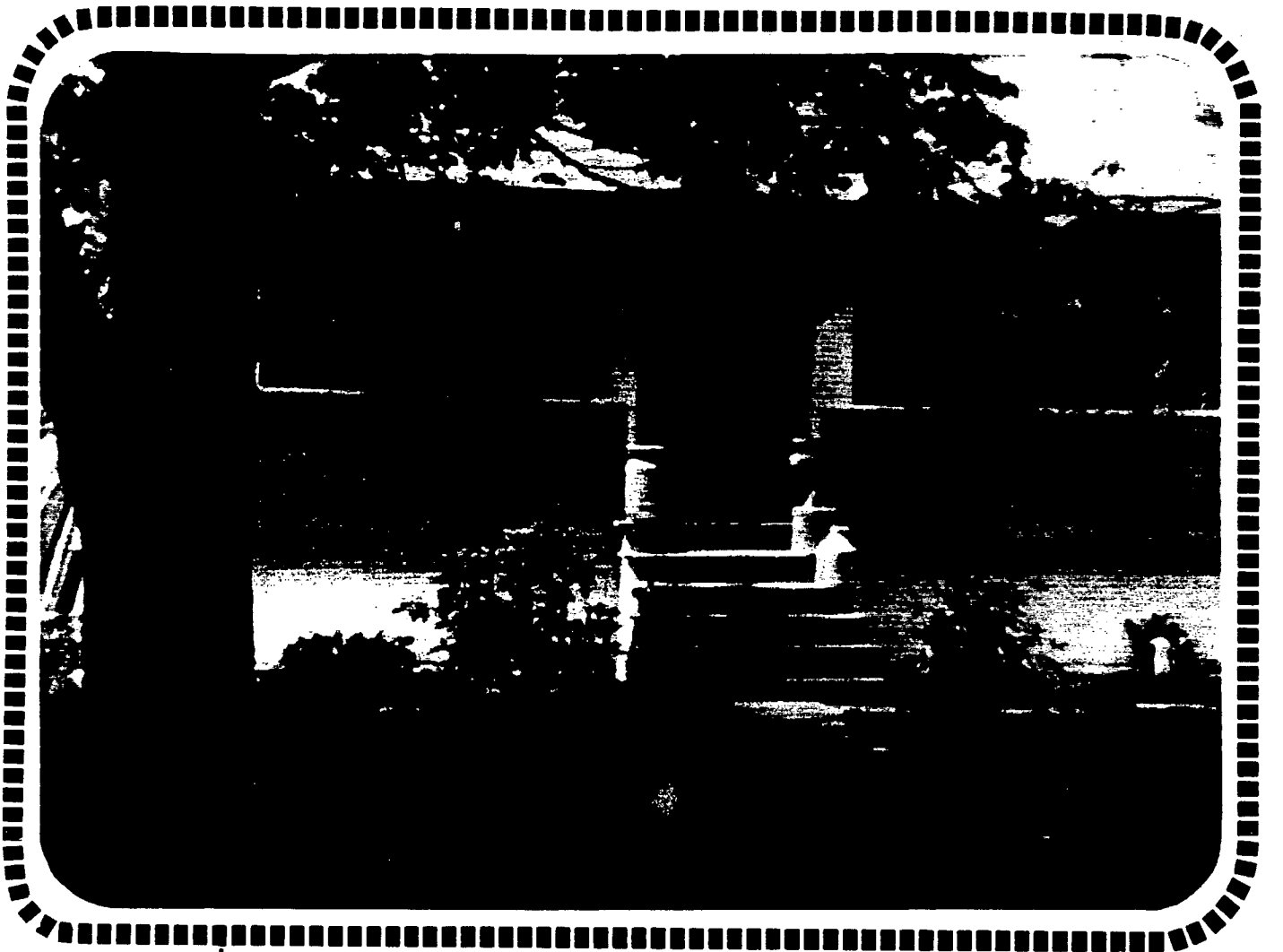
VINES None

VEGETABLE GARDEN None

ROCK GARDEN 40 ft^2 misc. rocks used in landscaping

NOTE: ADDITIONAL INVENTORY OF TREES, SHRUBS, FERNS, VINES, AND HERBACEOUS CATEGORY ITEMS LISTED ON PAGE

MISCELLANEOUS PERSONAL PROPERTY ITEMS: 18' Dia. above ground swimming pool, & Misc. equipment, Misc. limber piles, fishing boat, old window casings, Misc. pieces of siding material, dog house, swing set, garbage dumpster, 25 R.R. ties used in landscaping, 4 ft Dia. wooden barrel cut in half used as planter



6

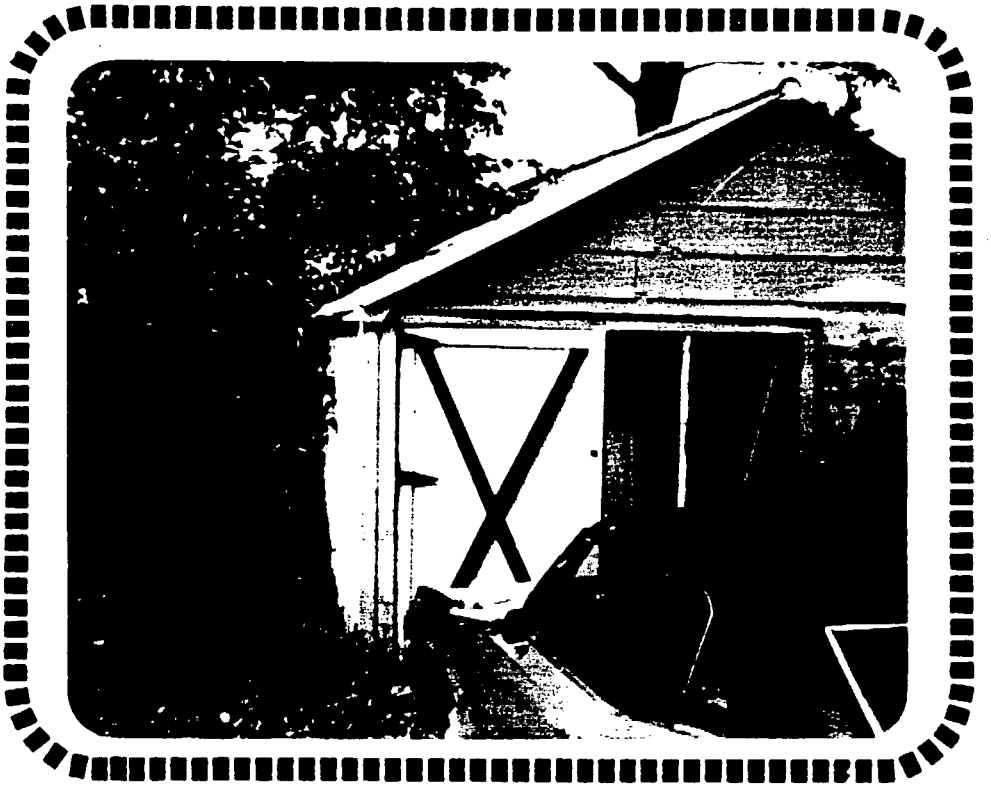
RICHARD & JOHANNA SMITH
203 MOUNTAIN AVE
LOTS 16-18, BLOCK 318
BOROUGH OF MIDDLESEX

95

Swimming Pool at Rear of House (SMITH)

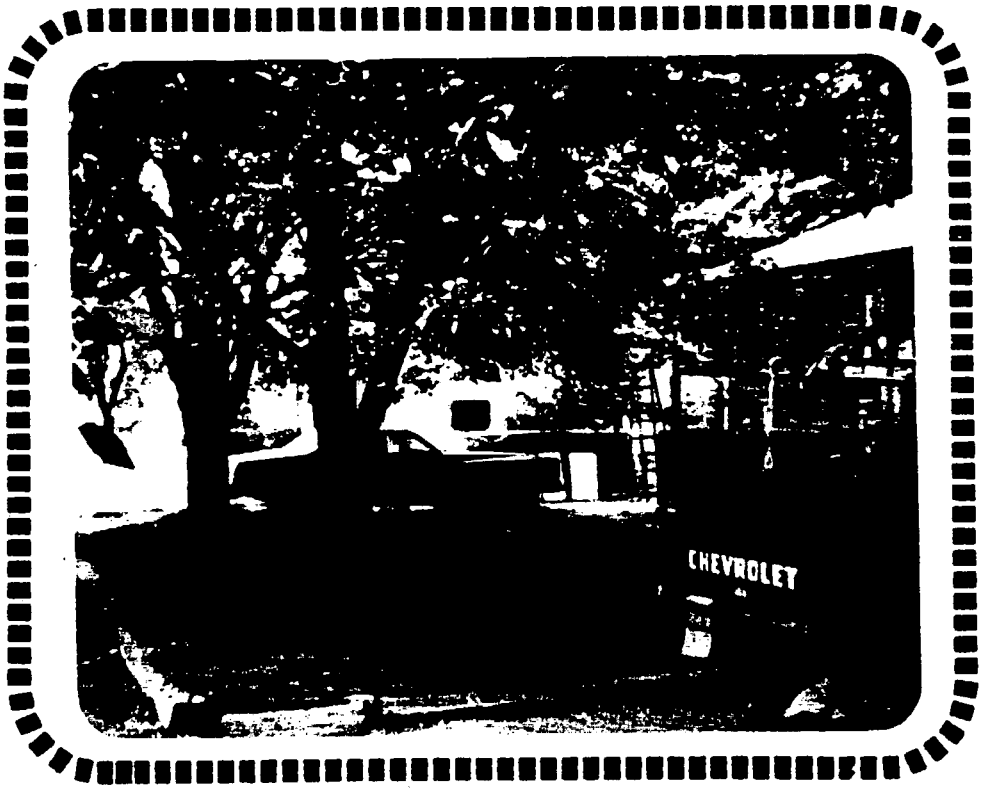
Area Between USMC Base and Smith Property

S.E. Corner of Property (SMITH)



Front (East) of Garage (SMITH)

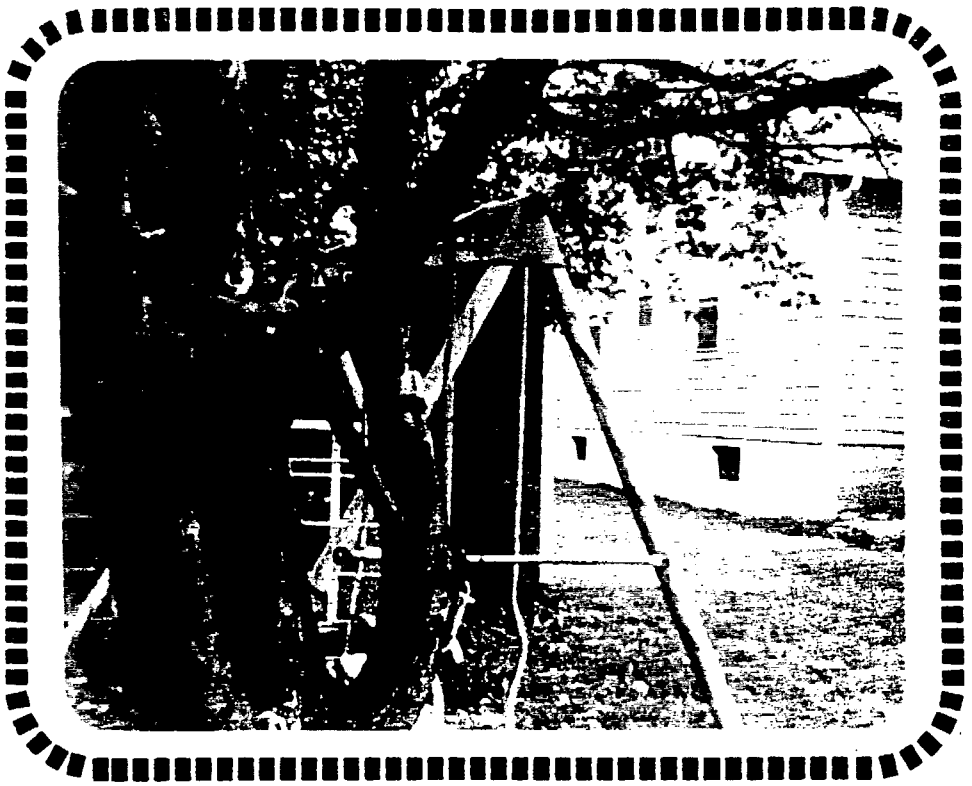
N. E. Corner of Property (SMITH)



Front (East) of Property (SMITH)

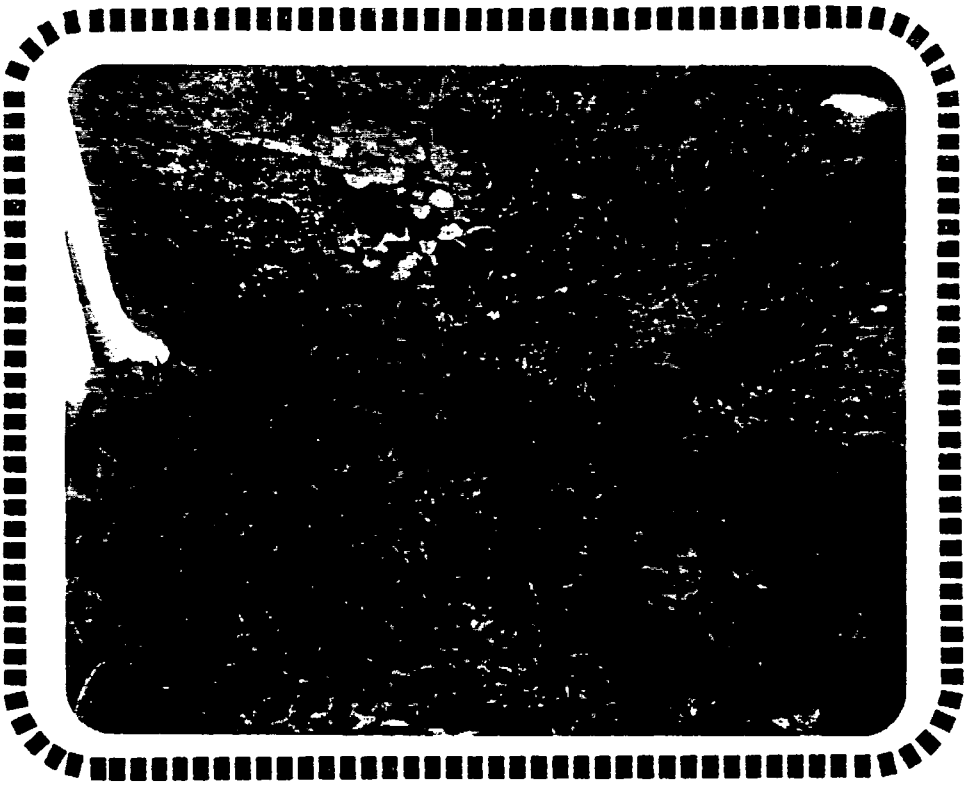
Area Between USMC Base and Smith Property

Area Between USMC Base and Smith Property



N.W. Corner of Property (SMITH)

Rear (West) of House (SMITH)

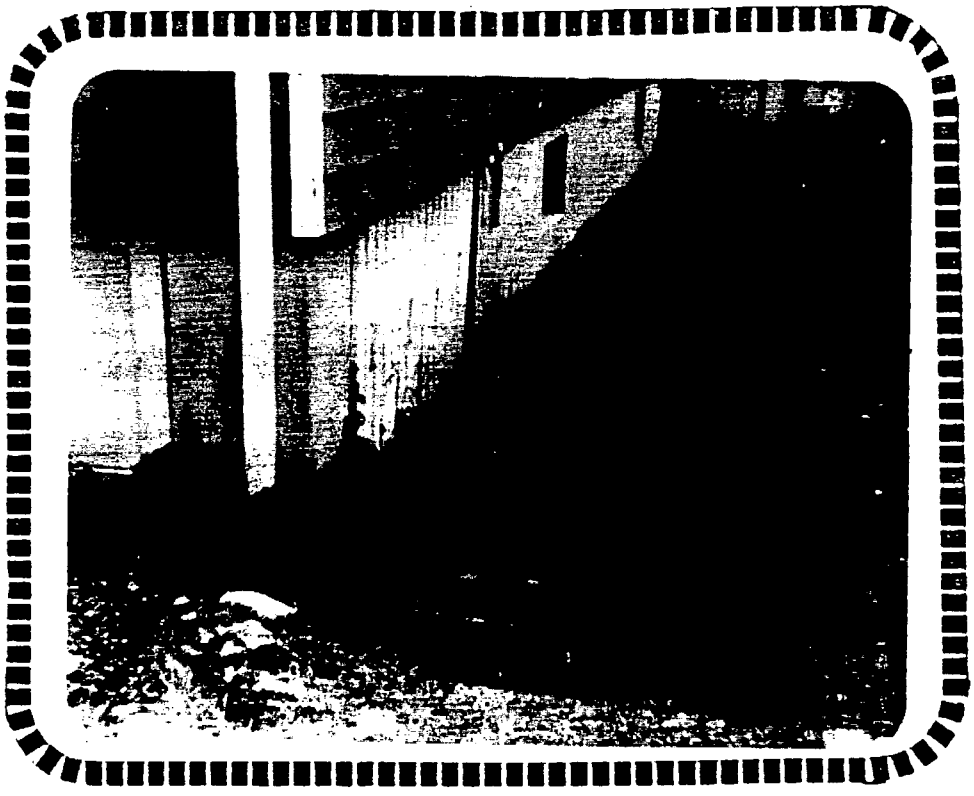


Downspout at N.W. Corner of House (SMITH)

North Side of Garage and Swimming Pool Deck
(SMITH)

South Side of House (SMITH)

Downspout at S.E. Corner of House
(SMITH)



Downspout at N.E. Corner of House (SMITH)

Prepared for

United States Department of Energy

Formerly Utilized MED/AEC Sites Remedial Action Program

Middlesex Sampling Plant & Associated Properties

DESCRIPTION OF REMEDIAL ACTION

Property Owner

RAYMOND & ELAINE REEFER
LOTS 44-50, BLOCK 389
TOWNSHIP OF PISCATAWAY

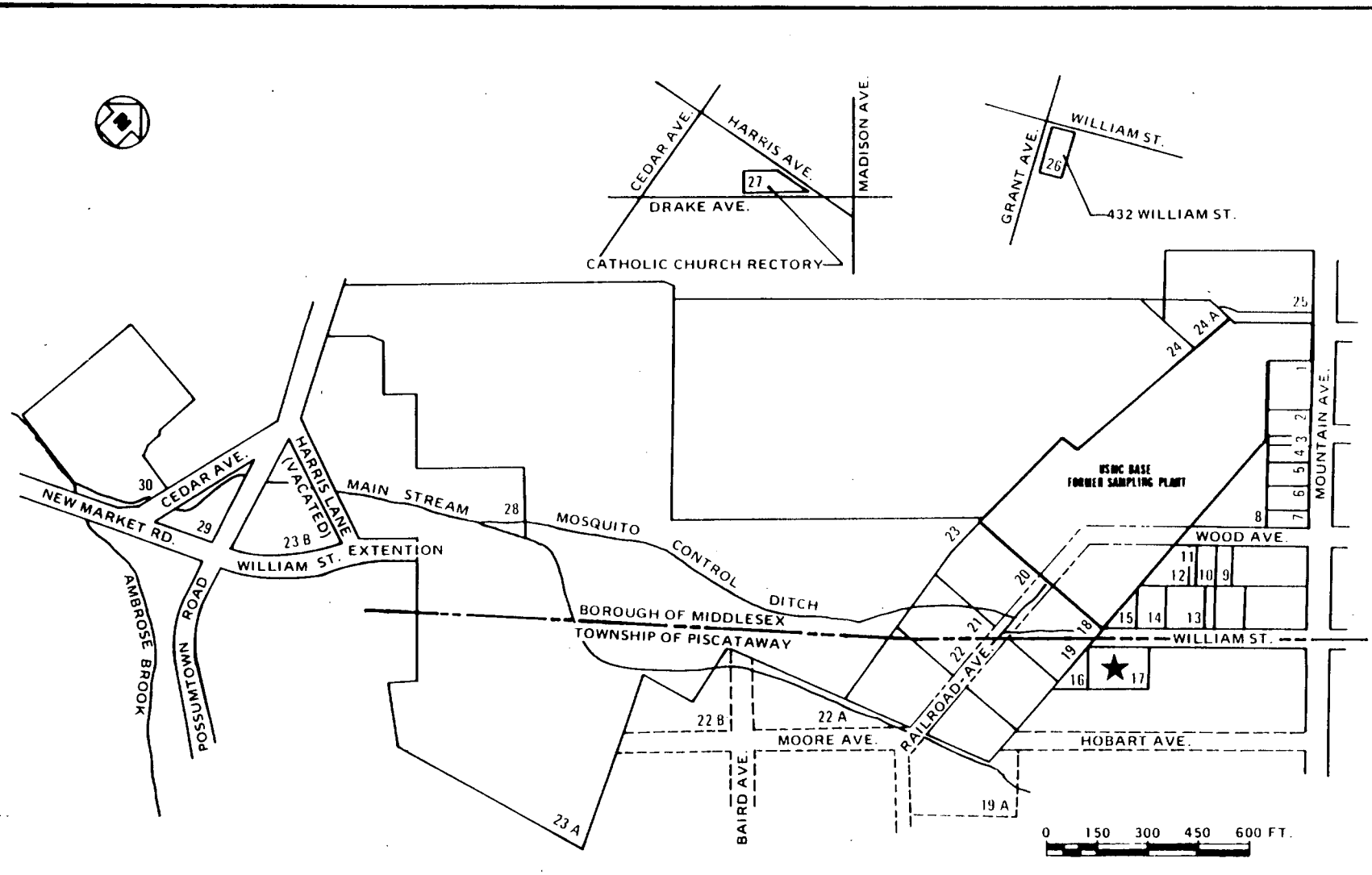
17

April 1979

by

Ford, Bacon & Davis
375 Chipeta Way
Salt Lake City, Utah

105

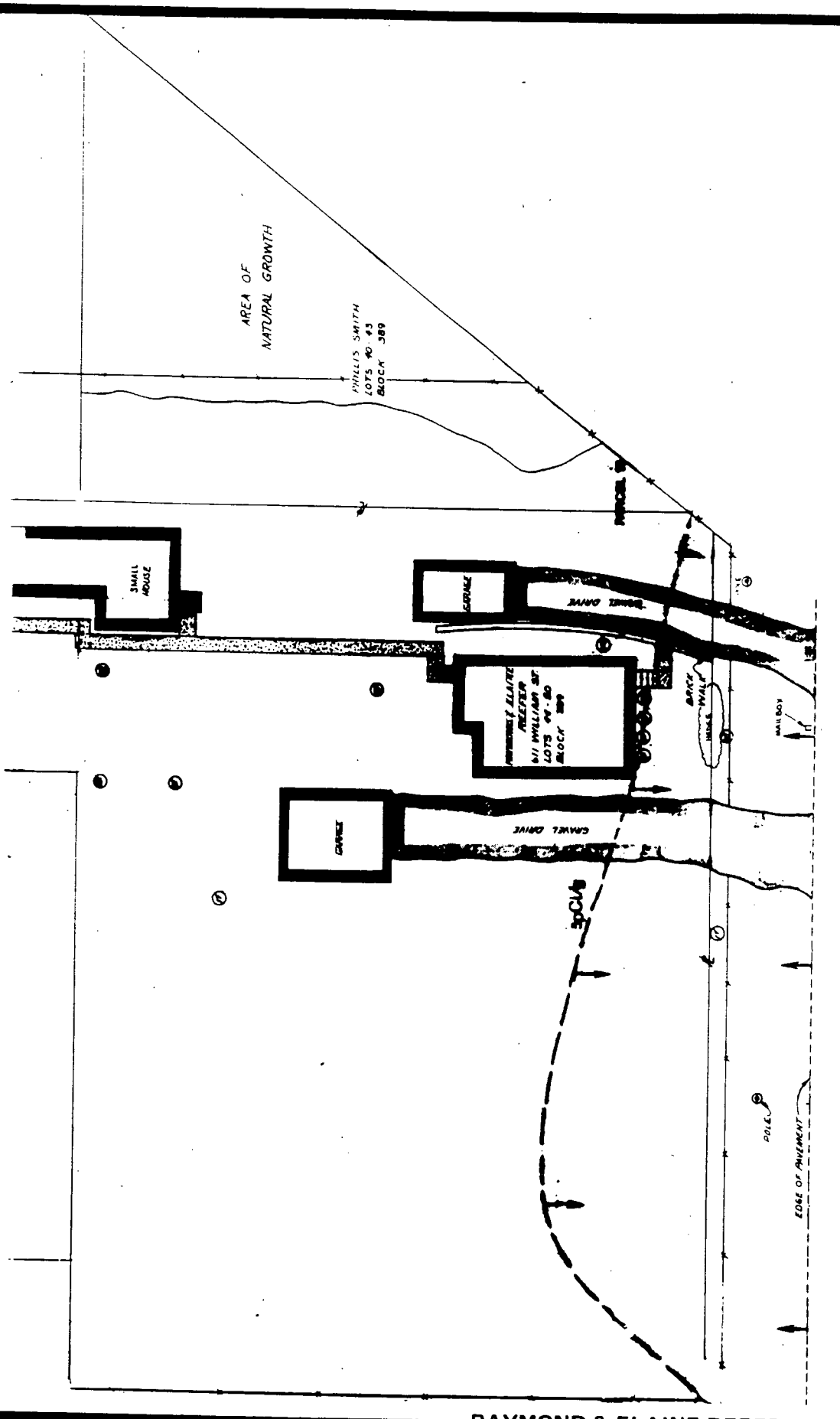


VICINITY MAP

★ **RAYMOND & ELAINE REEFER**
LOTS 44-50, BLOCK 389
TOWNSHIP OF PISATAWAY

17

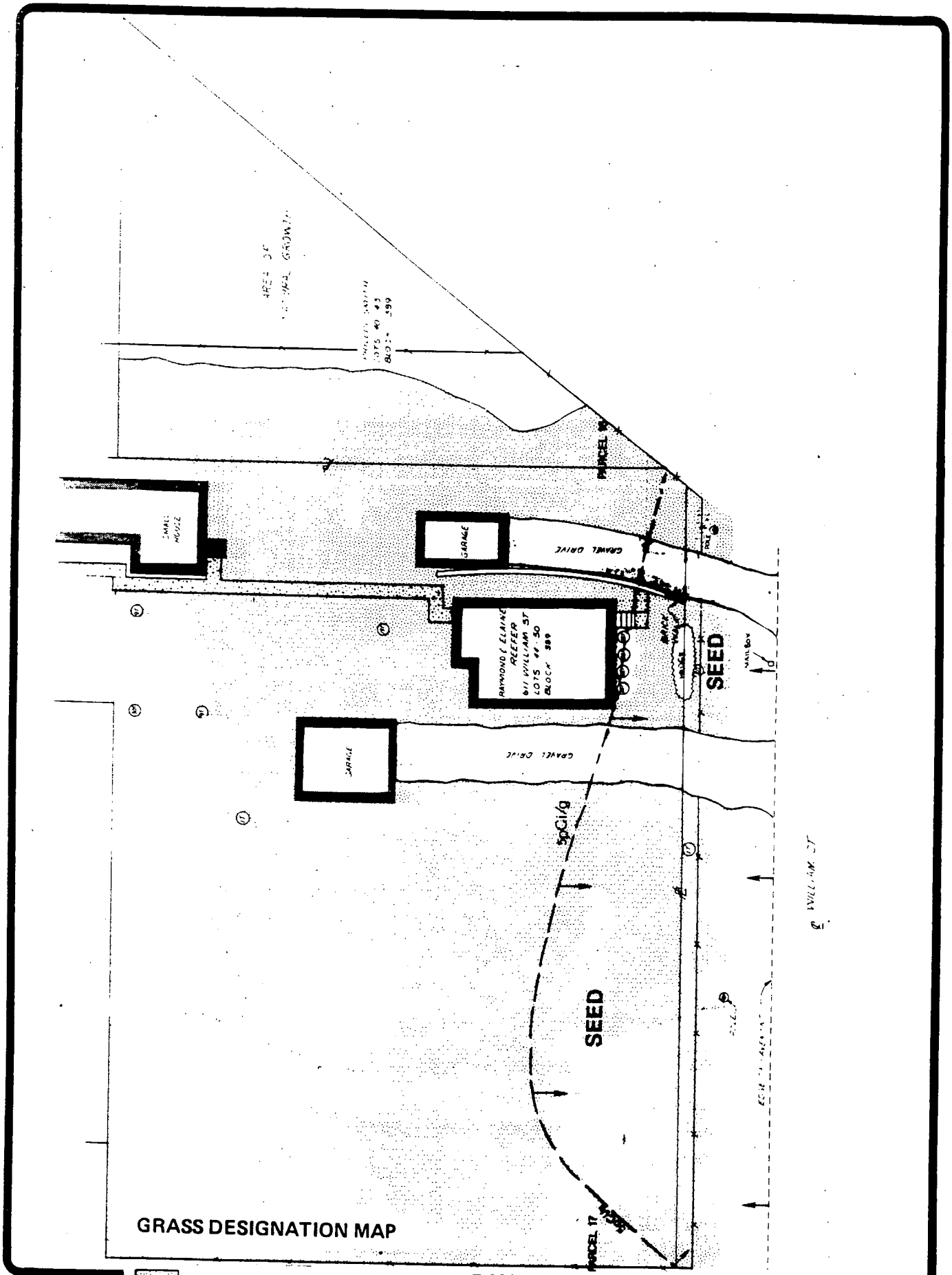
12



PARCEL MAP

RAYMOND & ELAINE REEFER
LOTS 44-50, BLOCK 389
TOWNSHIP OF PISCATAWAY

17



RAYMOND & ELAINE REEFER
LOTS 44-50, BLOCK 389
TOWNSHIP OF PISATAWAY

17 108

Raymond & Elaine Reefer
Parcel 17
Lots 44-50, Block 398
Township of Piscataway

DESCRIPTION OF REMEDIAL ACTIONS

Recent surveys have shown that low level radioactive contamination exists on this property. To remove this contamination as part of the overall remedial action program, it will be necessary to remove some of the improvements as well. Structures such as the residence or garage will not be disturbed. The property will be physically restored as nearly as reasonably practical to the conditions existing at the start of the decontamination activities. Efforts will be made to minimize disruptions and inconvenience to the occupants. When initiated, the work will be carried through to completion.

On this property, it is anticipated that the following improvements will be affected:

1 - Grassy areas

2 - Trees, shrubs, and flowers

3 - Sidewalks

4 - Driveways

5 - Mailbox

6 - Fences

It will be necessary to excavate contaminated soil, and vegetation and some improvements within the proposed limits of cleanup as shown on the Parcel Map. The exact limits and depths

will be determined at the time of excavation. The excavated areas will be filled with compacted backfill.

Areas planted with grass will receive six inches of topsoil. Whenever possible plantings will be replaced in kind; however, larger trees and shrubs will be replaced with as large a size as reasonable. Whenever possible, large mature plantings will not be removed. The feasibility of saving the plantings will be dependent on the size and type of planting as well as the depth of excavation. The final determination as to which plantings can be left will be made at the time of excavation.

Concrete replacement sidewalks will be four inches thick and will be placed on six inches of compacted gravel. Gravel driveways will be composed of eight inches of compacted gravel.

The existing mailbox will be removed and reinstalled upon completion of backfilling operations. A portion of the existing fence be removed and reinstalled.

All uncontaminated personal items on the property that are to be saved will be removed, stored and returned to the property. Any of the owner's unwanted items on the property at the time of decontamination, will be disposed of by the contractors at the owner's option.

If the property owner desires any betterments to the

existing improvements, these will be negotiated with the Department of Energy and will be included in the Special Provisions Section.

///

LAND OWNER
PACKAGE INVENTORY

OWNER

NAME: Raymond and Elaine Reefer

ADDRESS: 611 William Street, Piscataway, New Jersey

PROPERTY DESCRIPTION

LOT 44-50

BLOCK 389

~~BORO~~/TOWNSHIP Piscataway

LEGAL DESCRIPTION: Lot 44-50, Block 389, Township of Piscataway

IMPROVEMENTS:

		Front House	Rear House
DWELLINGS:	SQ. FT.	Approx. 1400 ft^2 (Main Level)	Approx. 1750 ft^2 (Main Level)
	LEVELS	2	2
	CONST.	Frame	Frame
GARAGE:	SINGLE	2 (Frame Construction)	
	DOUBLE		
	OTHER		
STORAGE BUILDING:			
	PREFAB		
	OTHER	Wooden Sheds (2) 5'x8', 5'x7'	

IMPROVEMENTS TO DWELLINGS:

	ADDITIONS	None
	PORCHES	
	DECKS	
	PATIO	
DRIVEWAYS:	CONCRETE	Left Right
	PAVED	
	GRAVEL	Approx. 800 ft^2 Approx. 400 ft^2
	UNIMPROVED	
SIDEWALKS:	CONCRETE	Approximately 160 ft^2
	PAVED	
	GRAVEL	
	STONE	
	BRICK	Approximately 55 lf

FENCES - GATES.

WOOD

CHAIN LINK Approximately 900 lft

BARBED WIRE

OTHER

LANDSCAPING

LAWN GRASS SQ. FT. Seed: 18,000 ft^2

TREES 1T, 8T, 9T, 13T, 16T, 20T, 21T, 22T, 23T, 28T, 35T, 39T, 48T

SHRUBS 1S

HERBACEOUS CATEGORY (FLOWERING)

FERNS

VINES Vines 2, Vines 5

VEGETABLE GARDEN

ROCK GARDEN

NOTE: ADDITIONAL INVENTORY OF TREES, SHRUBS, FERNS, VINES, AND HERBACEOUS CATEGORY ITEMS LISTED ON PAGE

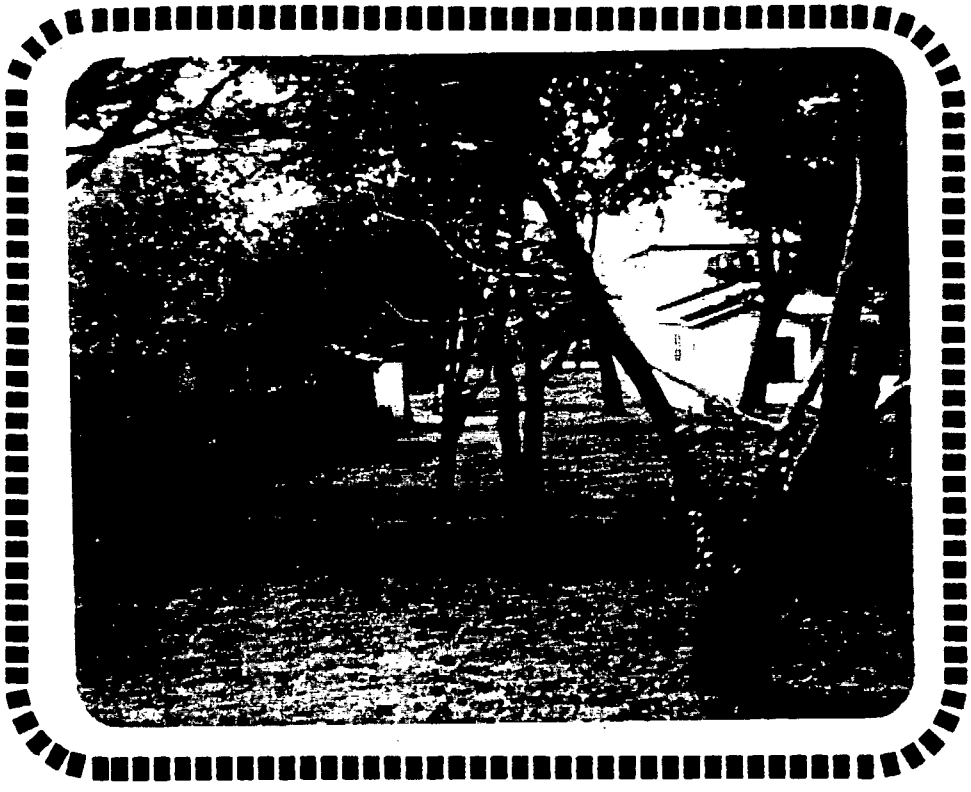
MISCELLANEOUS PERSONAL PROPERTY ITEMS: Mail Box mounted on post, box for newspaper delivery, garden hose 100 ft, 2-30 gal garbage cans, misc. lawn furniture

17

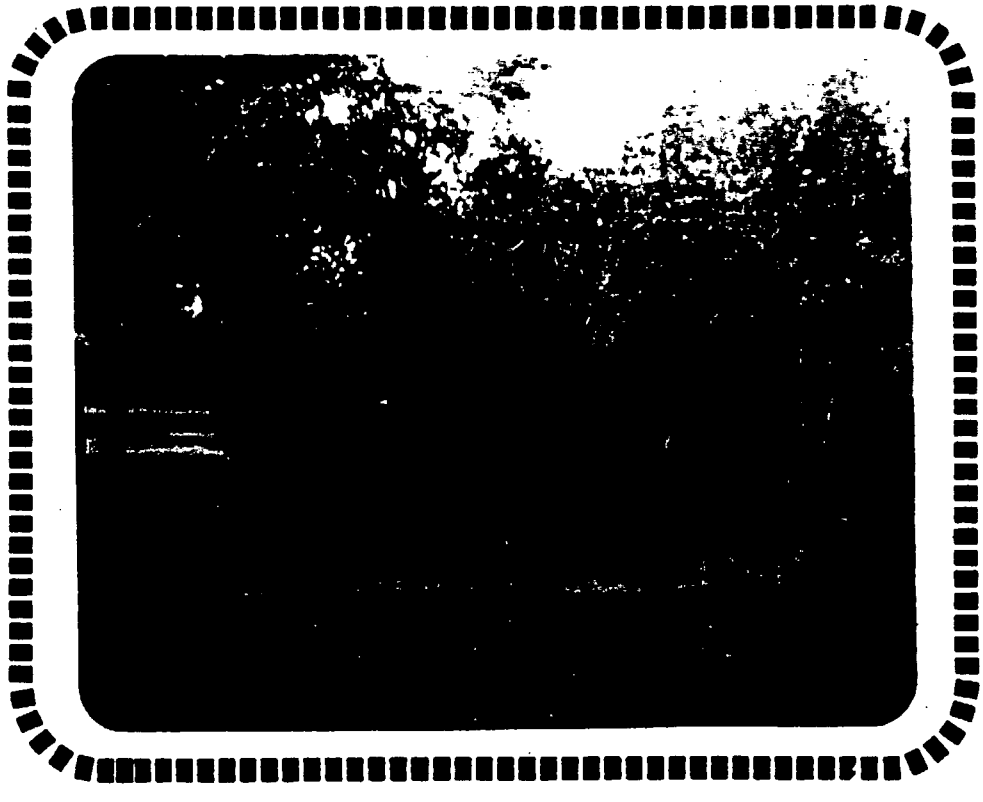
RAYMOND & ELAINE REEFER
611 WILLIAM STREET
LOTS 44-50, BLOCK 398
TOWNSHIP OF PISCATAWAY

Front (North) of Front House and Drive (REEFER)

Front (North) of Rear House and West Property Line (REEFER)



Back (South) of Rear House and Orchard (REEFER)



Behind Rear House at Orchard (REEFER)

S.E. Corner of Property (REEFER)

East Property Line (REEFER)

East Side of Property and Garage (RIGHT)

East Side of Front House W/Garage (Right)

West Side of Front House and Garage (Left)
(REEFER)

Front (North) of Rear House (REEFER)

Front (North) and West Side of Rear House
(REEFER)

Northwest Corner of Property at William St.
(Reefer)

North Side of Property at William St.
(Reefer)

Prepared for

United States Department of Energy

Formerly Utilized MED/AEC Sites Remedial Action Program

Middlesex Sampling Plant & Associated Properties

DESCRIPTION OF REMEDIAL ACTION

Property Owner

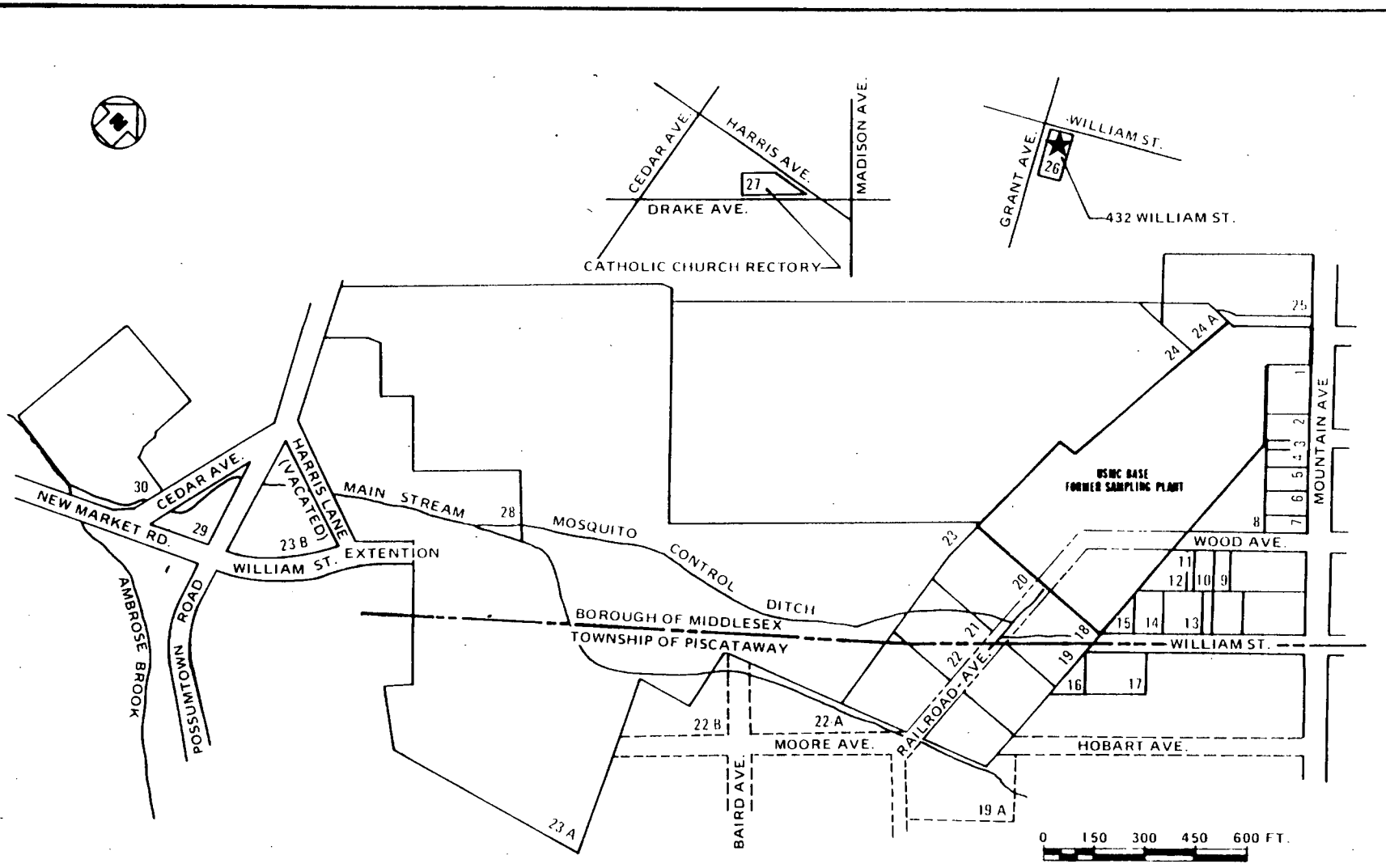
SARANTOS PAPGHIS
432 WILLIAM STREET
TOWNSHIP OF PISCATAWAY

26

April 1979

by
Ford, Bacon & Davis
375 Chipeta Way
Salt Lake City, Utah

122

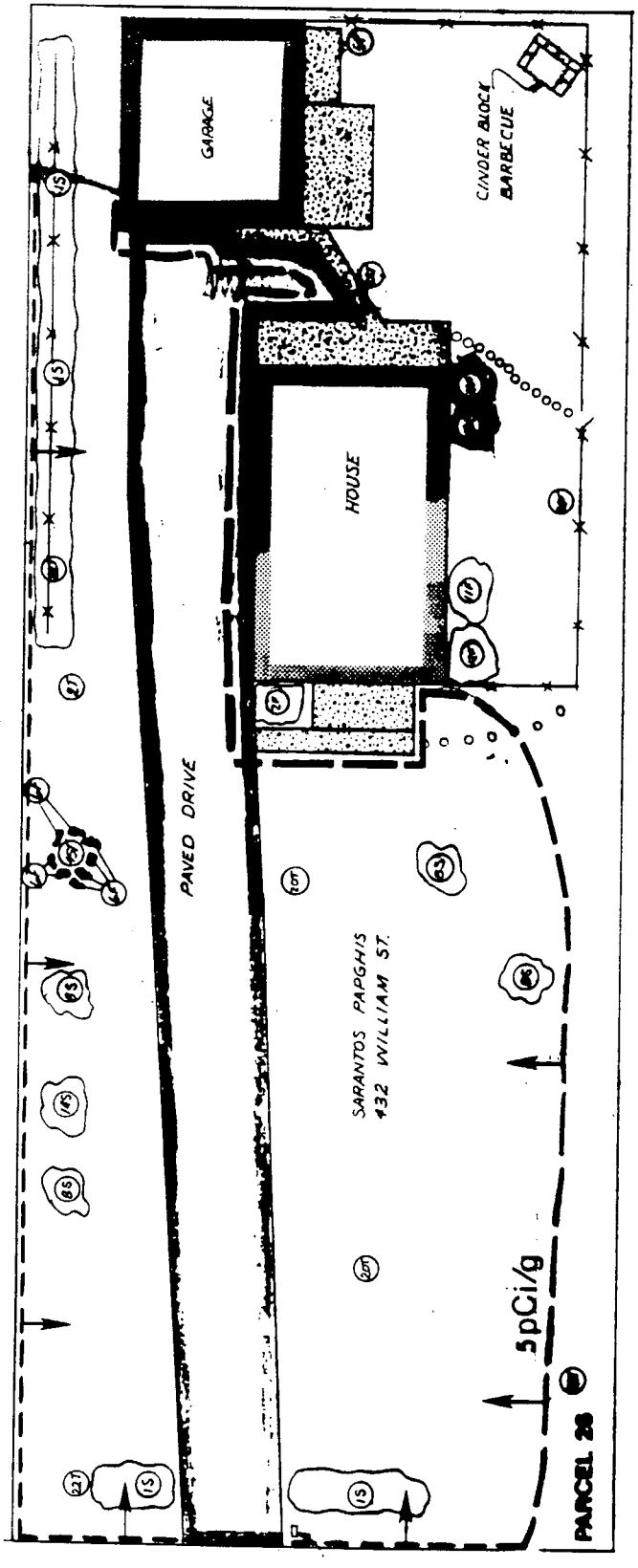


VICINITY MAP

123

★ **SARANTOS PAPGHIS**
432 WILLIAM STREET
TOWNSHIP OF PISCATAWAY

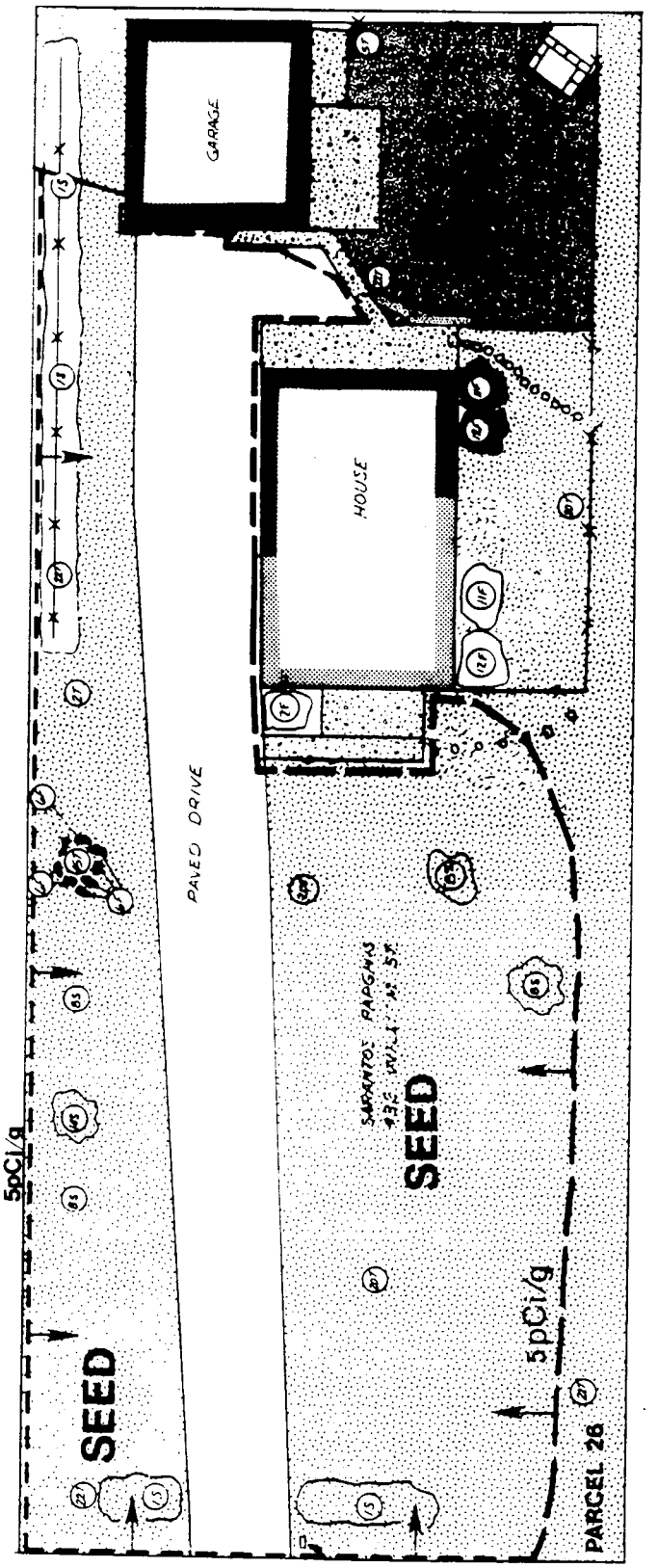
26



PARCEL MAP

SARANTOS PAPGHIS
432 WILLIAM STREET
TOWNSHIP OF PISCATAWAY

26



GRASS DESIGNATION MAP

SARANTOS PAPGHIS
432 WILLIAM STREET
TOWNSHIP OF PISCATAWAY

26

Sarantos Papghis
Parcel 26
Lot 1, Block 185
Township of Piscataway

DESCRIPTION OF REMEDIAL ACTIONS

Recent surveys have shown that low level radioactive contamination exists on this property. To remove this contamination as part of the overall remedial action program, it will be necessary to remove some of the improvements as well. Structures such as the residence or garage will not be disturbed. The property will be physically restored as nearly as reasonably practical to the conditions existing at the start of the decontamination activities. Efforts will be made to minimize disruptions and inconvenience to the occupants. When initiated, the work will be carried through to completion.

On this property, it is anticipated that the following improvements will be affected:

1 - Lawns and grassy area

2 - Trees, shrubs, and flowers

3 - Sidewalks

4 - Driveways

5 - Fences

It will be necessary to excavate contaminated soil, and vegetation and some improvements within the proposed limits of cleanup as shown on the Parcel Map. The exact limits and depths will be determined at the time of excavation. The excavated

areas will be filled with compacted backfill.

Lawns will be replaced with sod or topsoil as shown on the Grass Designation Map. Sod will be placed on four inches of topsoil. Areas planted with grass will receive six inches of topsoil.

Whenever possible plantings will be replaced in kind; however, larger trees and shrubs will be replaced with as large a size as reasonable. Whenever possible, large mature plantings will not be removed. The feasibility of saving the plantings will be dependent on the size and type of planting as well as the depth of excavation. The final determination as to which plantings can be left will be made at the time of excavation.

Concrete replacement sidewalks will be four inches thick and will be placed on six inches of compacted gravel. Paved driveways will be composed of three inches of plant-mixed asphalt placed on six inches of compacted gravel.

The existing fences will be removed and be replaced at the option of the property owner.

All uncontaminated personal items on the property that are to be saved will be removed, stored and returned to the property. Any of the owner's unwanted items on the property at the time of decontamination, will be disposed of by the contractors at the owner's option.

If the property owner desires any betterments to the existing improvements, these will be negotiated with the Department of Energy and will be included in the Special Provisions Section.

LAND OWNER
PACKAGE INVENTORY

OWNER

NAME: Sarantos Papchis

ADDRESS: 432 William Street

PROPERTY DESCRIPTION

LOT: 1

BLOCK: 185

BORO/TOWNSHIP: Piscataway

LEGAL DESCRIPTION:

IMPROVEMENTS:

DWELLINGS:
- SQ. FT.: Approximately 715 ft (main floor)
- LEVELS:
- CONST.: Frame

GARAGE:
- SINGLE: Frame approximately 440 ft^2
- DOUBLE:
- OTHER:

STORAGE BUILDING:
- PREFAB: None
- OTHER:

IMPROVEMENTS TO DWELLINGS:
- ADDITIONS: None
- PORCHES:
- DECKS:
- PATIO: Approximately 130 ft^2

DRIVEWAYS:
- CONCRETE:
- PAVED: Approximately 2000 ft^2
- GRAVEL:
- UNIMPROVED:

SIDEWALKS:
- CONCRETE: Approximately 200 ft^2
- PAVED:
- GRAVEL:
- STONE: Approximately 18 stepping stones
- BRICK:

FENCES – GATES.

WOOD

CHAIN LINK Approximately 62 lf on NE side & approximately 105 lf on So. & West

BARBED WIRE

OTHER

LANDSCAPING:

LAWN/GRASS SQ. FT. Seed: Approximately 6550 ft^2 Sod: Approximately 800 ft^2

TREES 2T, 5T, 20T, 22T

SHRUBS 1S, 8S, 11S, 12S, 14S, 15S,

HERBACEOUS CATEGORY (FLOWERING) 2F, 6F, 7F

FERNS None

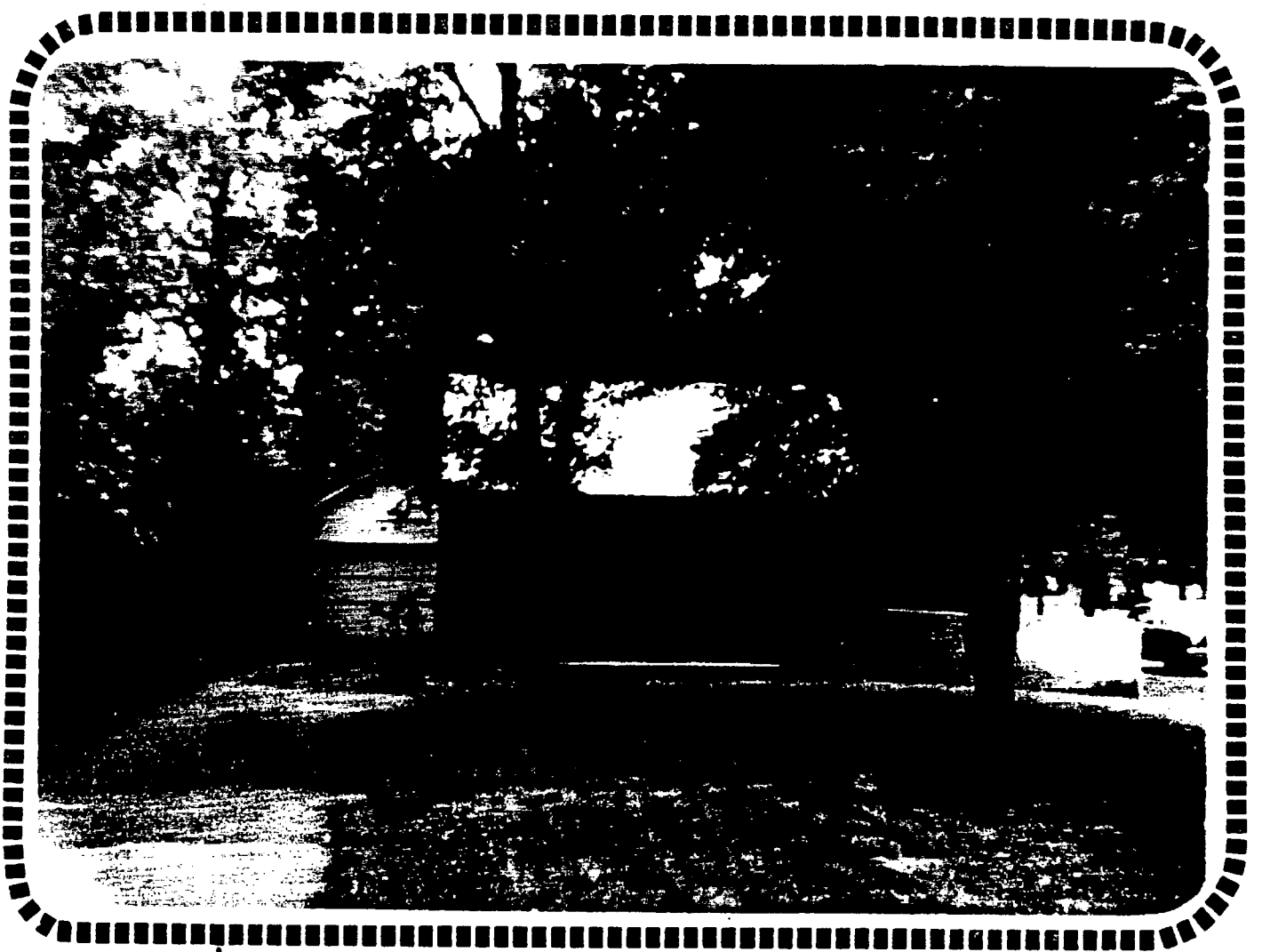
VINES None

VEGETABLE GARDEN None

ROCK GARDEN None

NOTE: ADDITIONAL INVENTORY OF TREES, SHRUBS, FERNS, VINES, AND HERBACEOUS CATEGORY ITEMS LISTED ON PAGE

MISCELLANEOUS PERSONAL PROPERTY ITEMS: Block Barb bq, mail box (mounted on post) 2-30 gal garbage cans, pile of assorted scrap wood, misc lawn furniture.



26

SARANTOS PAPGHIS
432 WILLIAM STREET
TOWNSHIP OF PISCATAWAY

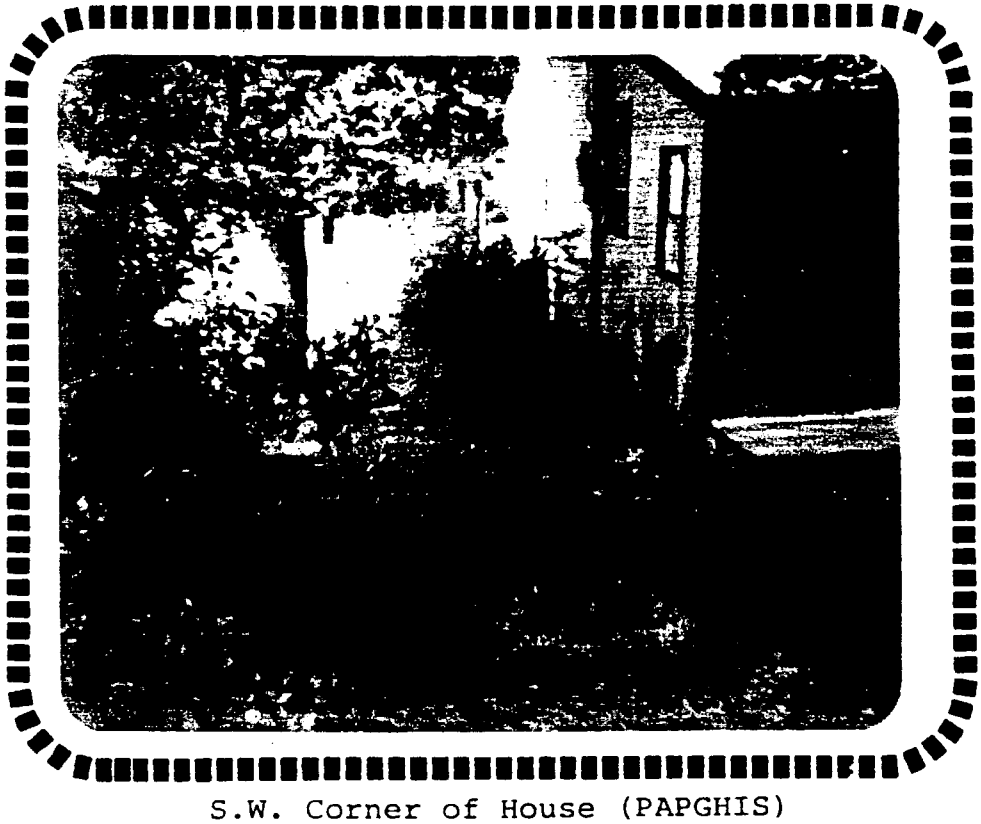
Northeast Corner of Property (PAPGHIS)

North Side of Property (PAPGHIS)

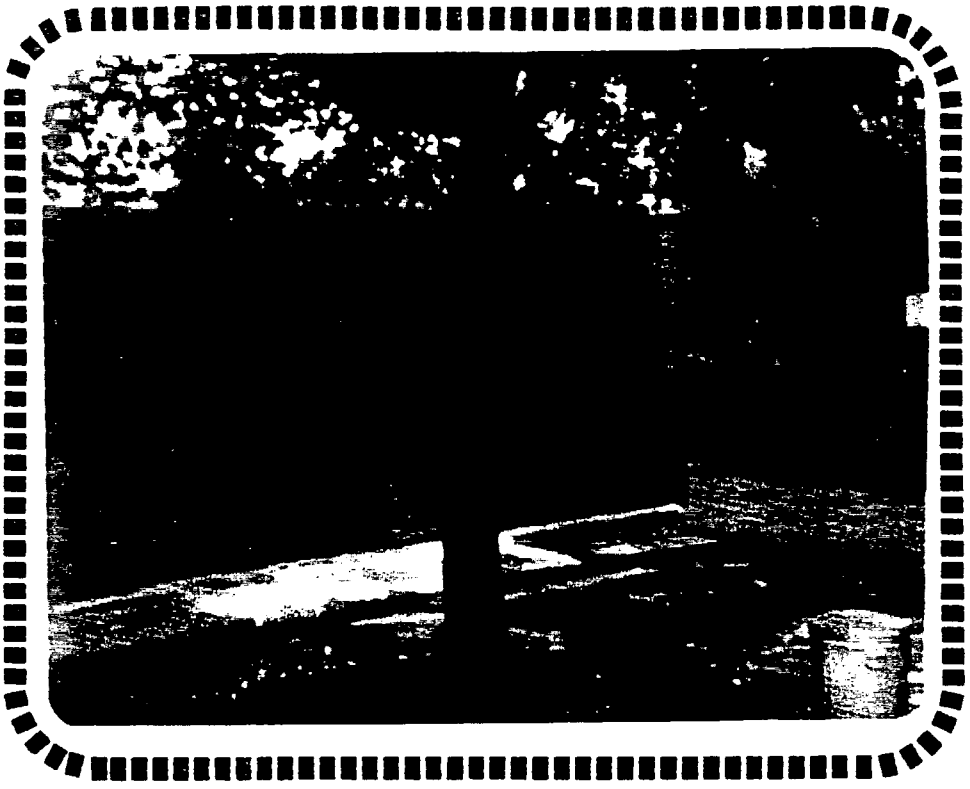
Front (North) of House (PAPGHIS)

West Side of House (PAPGHIS)

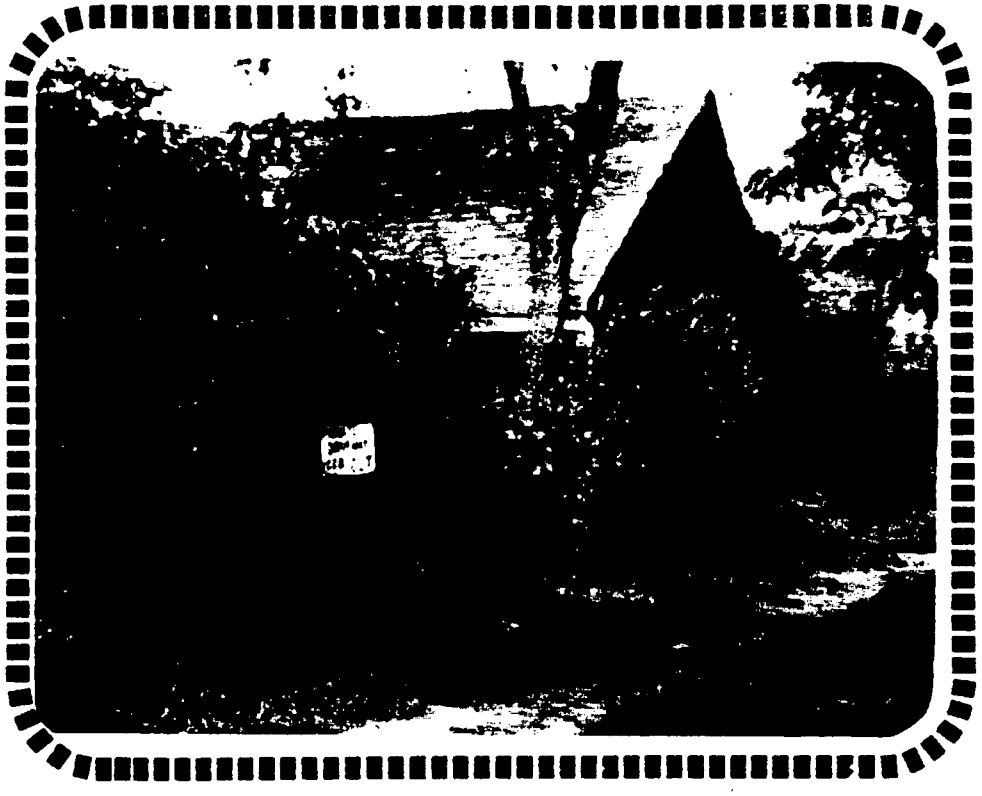
Front of Property (North) (PAPGHIS)



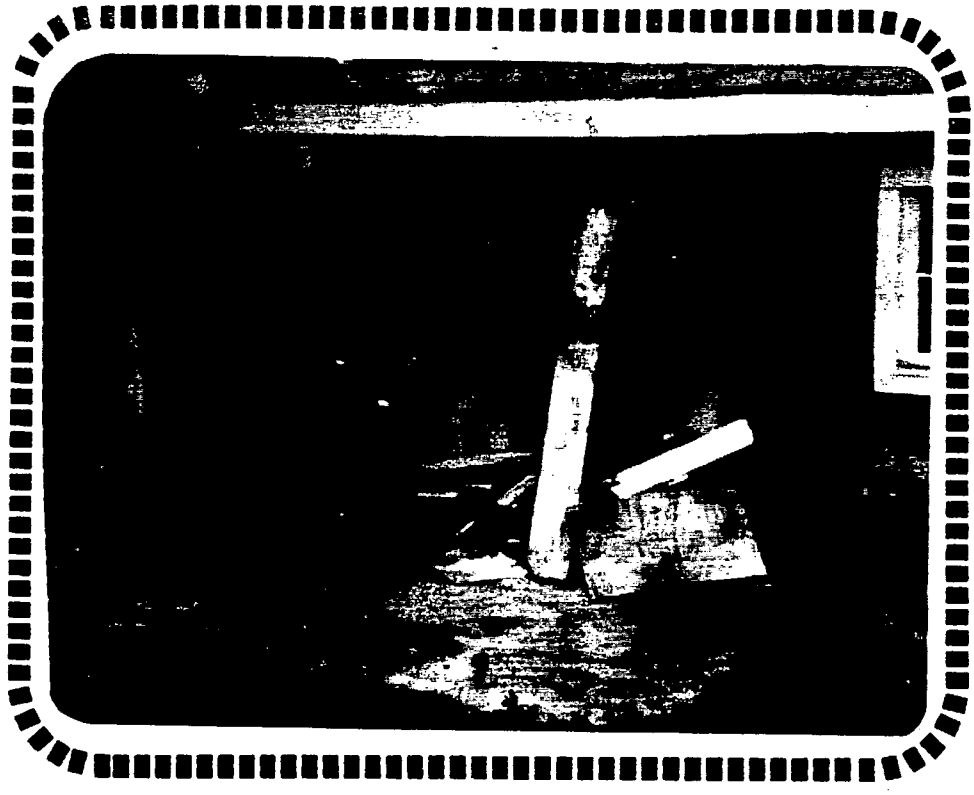
S.W. Corner of House (PAPGHIS)



Rear (South) of House (PAPGHIS)

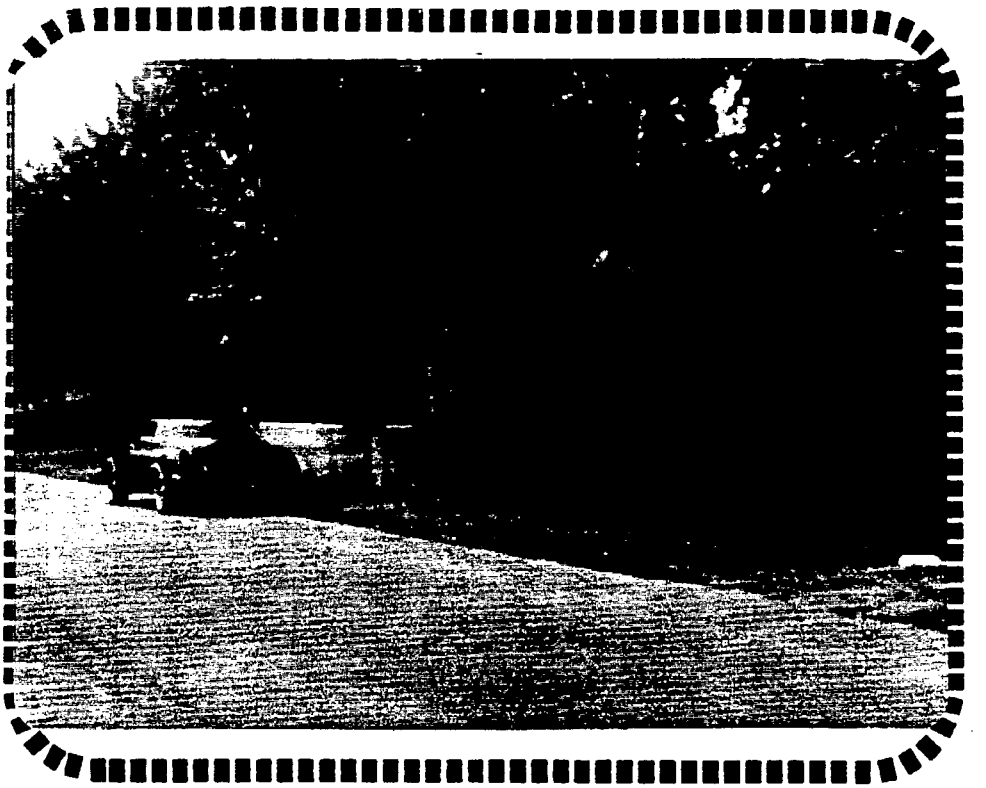


South Property Line (PAPGHIS)



East Side of Garage (PAPGHIS)

Front of Garage and Back Yard (PAPGHIS)



West Property Line From Grant St.

East Side of House and Driveway (PAPGHIS)

Prepared for

United States Department of Energy

Formerly Utilized MED/AEC Sites Remedial Action Program

Middlesex Sampling Plant & Associated Properties

DESCRIPTION OF REMEDIAL ACTION

Property Owner

CATHOLIC CHURCH RECTORY
LOTS 1-3 BLOCK 298
BOROUGH OF MIDDLESEX

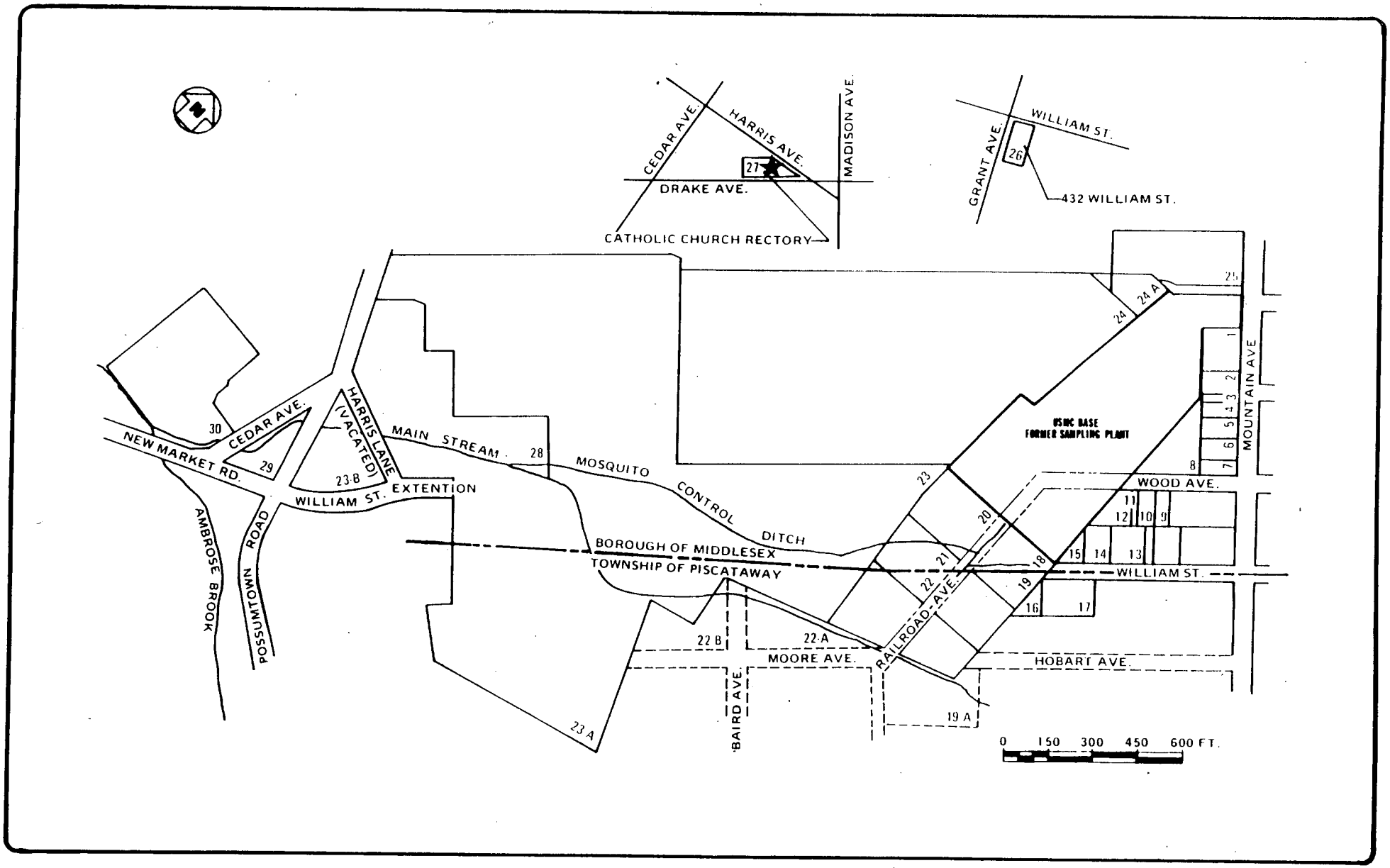
27

April 1979

by

Ford, Bacon & Davis
375 Chipeta Way
Salt Lake City, Utah

138

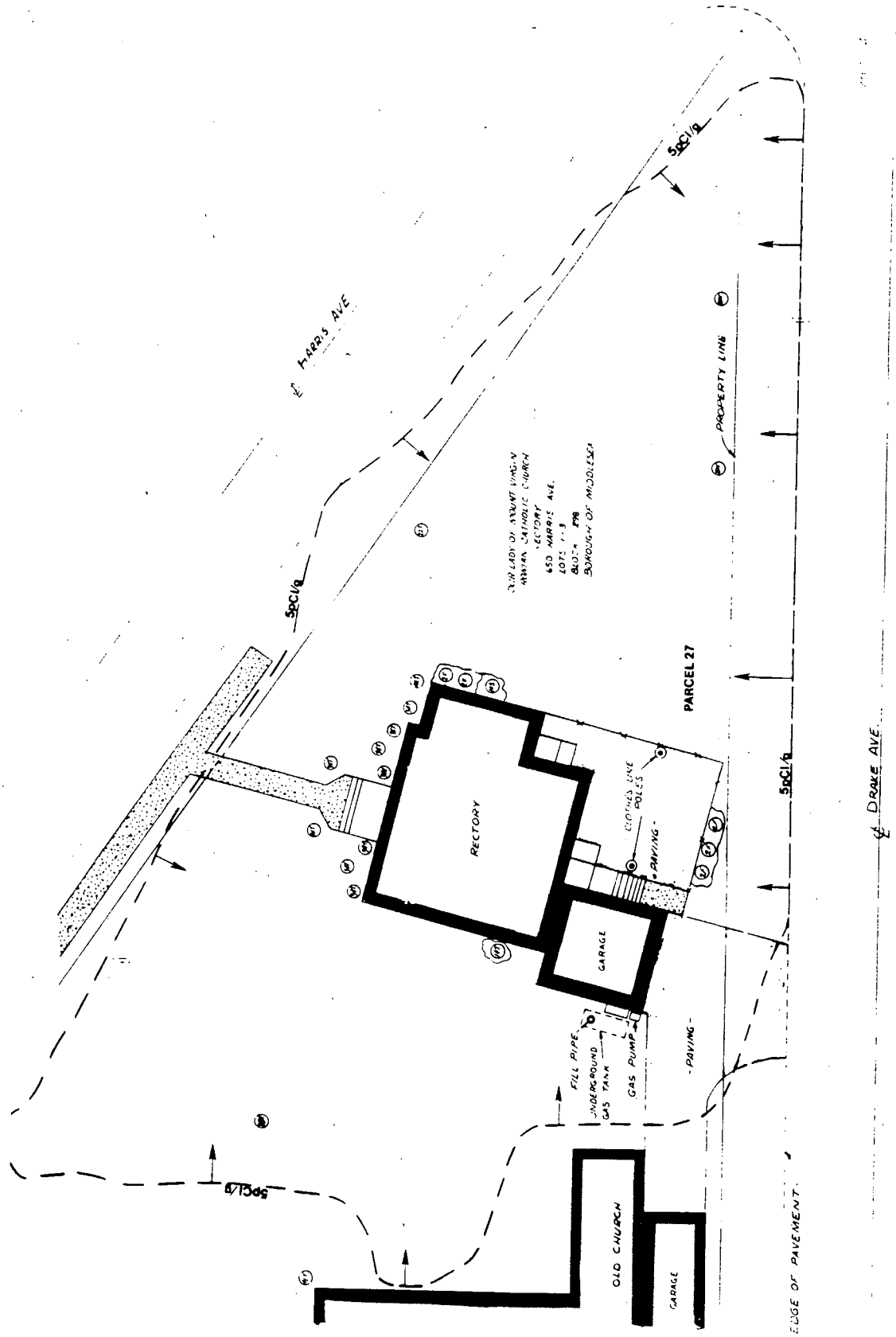


VICINITY MAP

139

★ **CATHOLIC CHURCH RECTORY**
LOTS 1-3, BLOCK 298
BOROUGH OF MIDDLESEX

27



PARCEL MAP

CATHOLIC CHURCH RECTORY
LOTS 1-3 BLOCK 298
BOROUGH OF MIDDLESEX

27

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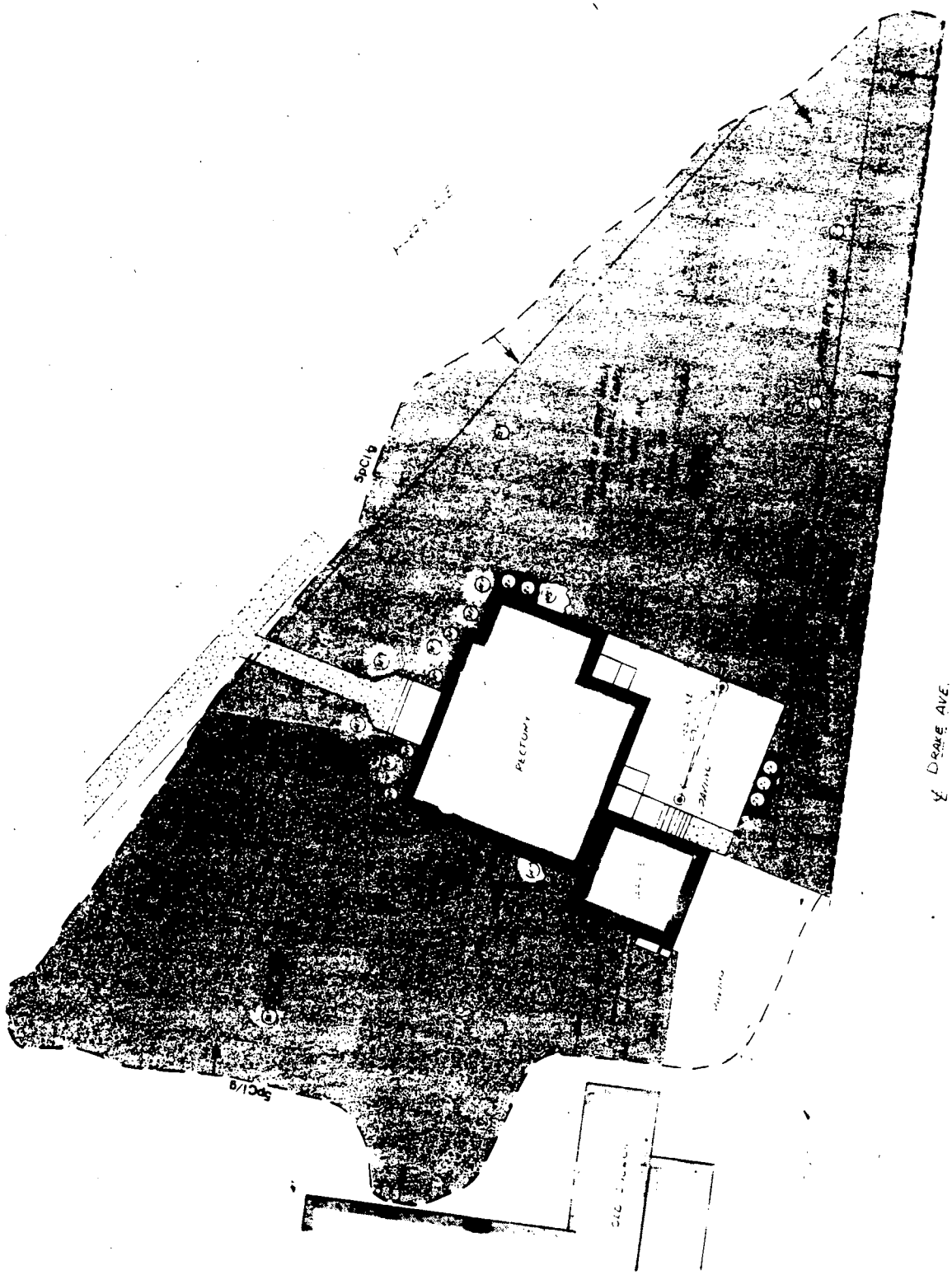


AREA WITHIN LIMITS OF DECONTAMINATION TO BE SEEDED

AREA WITHIN LIMITS OF DECONTAMINATION TO BE SODDED

CATHOLIC CHURCH RECTORY
LOTS 1-3, BLOCK 298
BOROUGH OF MIDDLESEX

27

GRASS DESIGNATION MAP

Catholic Church Rectory
Parcel 27
Lots 1-3, Block 298
Borough of Middlesex

DESCRIPTION OF REMEDIAL ACTIONS

Recent surveys have shown that low level radioactive contamination exists on this property. To remove this contamination as part of the overall remedial action program, it will be necessary to remove some of the improvements as well. Structures such as the residence or garage will not be disturbed. The property will be physically restored as nearly as reasonably practical to the conditions existing at the start of the decontamination activities. Efforts will be made to minimize disruptions and inconvenience to the occupants. When initiated, the work will be carried through to completion.

On this property, it is anticipated that the following improvements will be affected:

1 - Lawns

2 - Trees, shrubs, and flowers

3 - Sidewalks

4 - Driveways

5 - Clothesline poles

6 - Fences

7 - Paved patio

8 - Gas pumps and underground storages tanks

It will be necessary to excavate contaminated soil, and

vegetation and some improvements within the proposed limits of cleanup as shown on the Parcel Map. The exact limits and depths will be determined at the time of excavation. The excavated areas will be filled with compacted backfill.

Lawns will be replaced with sod or topsoil as shown on the Grass Designation Map. Sod will be placed on four inches of topsoil. Areas planted with grass will receive six inches of topsoil.

Whenever possible plantings will be replaced in kind, however, larger trees and shrubs will be replaced with as large a size as reasonable. Whenever possible, large mature plantings will not be removed. The feasibility of saving the plantings will be dependent on the size and type of planting as well as the depth of excavation. The final determination as to which plantings can be left will be made at the time of excavation.

Concrete replacement sidewalks will be four inches thick and will be placed on six inches of compacted gravel. Paved driveways will consist of three inches of plant-mixed asphalt placed on six inches of compacted gravel. The existing patio will be replaced with three inches of plant-mix placed on four inches of compacted gravel.

The existing clothesline poles will be removed and reinstalled upon completion of backfilling operations. The existing fences will be removed and be replaced at the option of the property owner.

Satisfactory agreement will be reached with the owner regarding the disposition of the gas pump and storage tanks.

All uncontaminated personal items on the property that are to be saved will be removed, stored and returned to the property. Any of the owner's unwanted items on the property at the time of decontamination, will be disposed of by the contractors at the owner's option.

If the property owner desires any betterments to the existing improvements, these will be negotiated with the Department of Energy and will be included in the Special Provisions Section.

LAND OWNER
PACKAGE INVENTORY

OWNER:

NAME: Catholic Church Rectory

ADDRESS: 650 Harris Avenue, Middlesex, New Jersey

PROPERTY DESCRIPTION

LOT 1-3

BLOCK 298

BORO/~~TOWNSHIP~~ Middlesex

LEGAL DESCRIPTION:

IMPROVEMENTS:

DWELLINGS: SQ. FT. Approximately 1600 ft^2

LEVELS 3 levels plus basement

CONST. Brick

GARAGE: SINGLE

DOUBLE Brick

OTHER

STORAGE BUILDING:

PREFAB None

OTHER

IMPROVEMENTS TO DWELLINGS:

ADDITIONS

PORCHES Open front, enclosed rear

DECKS Approximately 700 ft^2 (asphalt)

PATIO

DRIVEWAYS: CONCRETE

PAVED Approximately 1200 ft^2

GRAVEL

UNIMPROVED

SIDEWALKS: CONCRETE Approximately 900 ft^2 (from rectory to old church only)

PAVED

GRAVEL

STONE

BRICK

FENCES – GATES:

WOOD Approximately 70 lf (patio fence)

CHAIN LINK

BARBED WIRE

OTHER

LANDSCAPING:

LAWN/GRASS SQ. FT. Seed: Approximately 17,000 ft^2

TREES 20T, 22T, 34T, 38T, 41T, 44T,

SHRUBS 14 S

HERBACEOUS CATEGORY (FLOWERING) 2F, 14F

FERNS None

VINES None

VEGETABLE GARDEN None

ROCK GARDEN None

NOTE: ADDITIONAL INVENTORY OF TREES, SHRUBS, FERNS, VINES, AND HERBACEOUS CATEGORY ITEMS LISTED ON PAGE

MISCELLANEOUS PERSONAL PROPERTY ITEMS: Under ground gasoline tank w/pump, clothes line poles, 3-30 gal garbage cans.

27

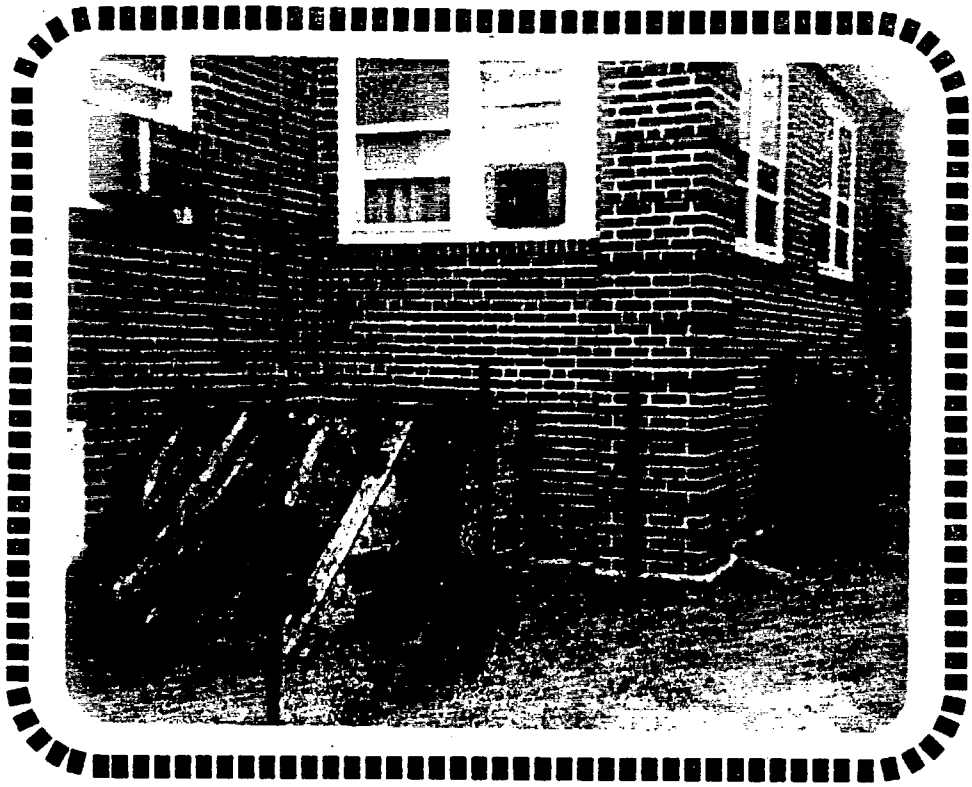
CATHOLIC CHURCH RECTORY
650 HARRIS AVE
LOTS 1-3, BLOCK 298
BOROUGH OF MIDDLESEX

Northwest Corner of Rectory

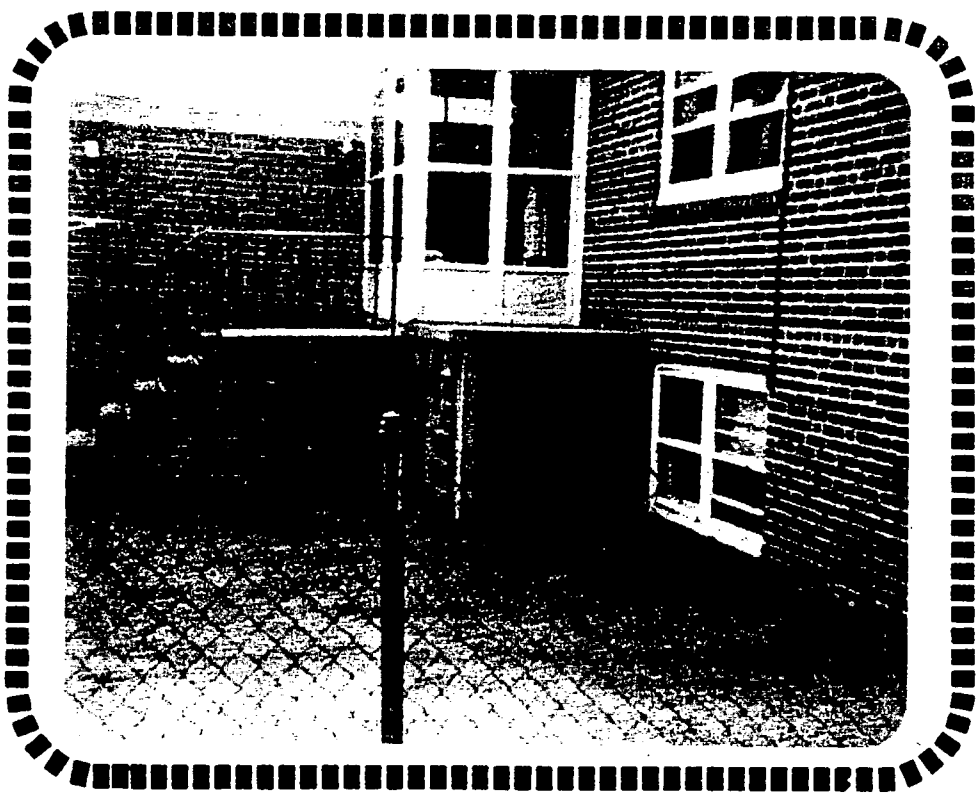
Area (North) Between Rectory and Old Church

East Side of Rectory

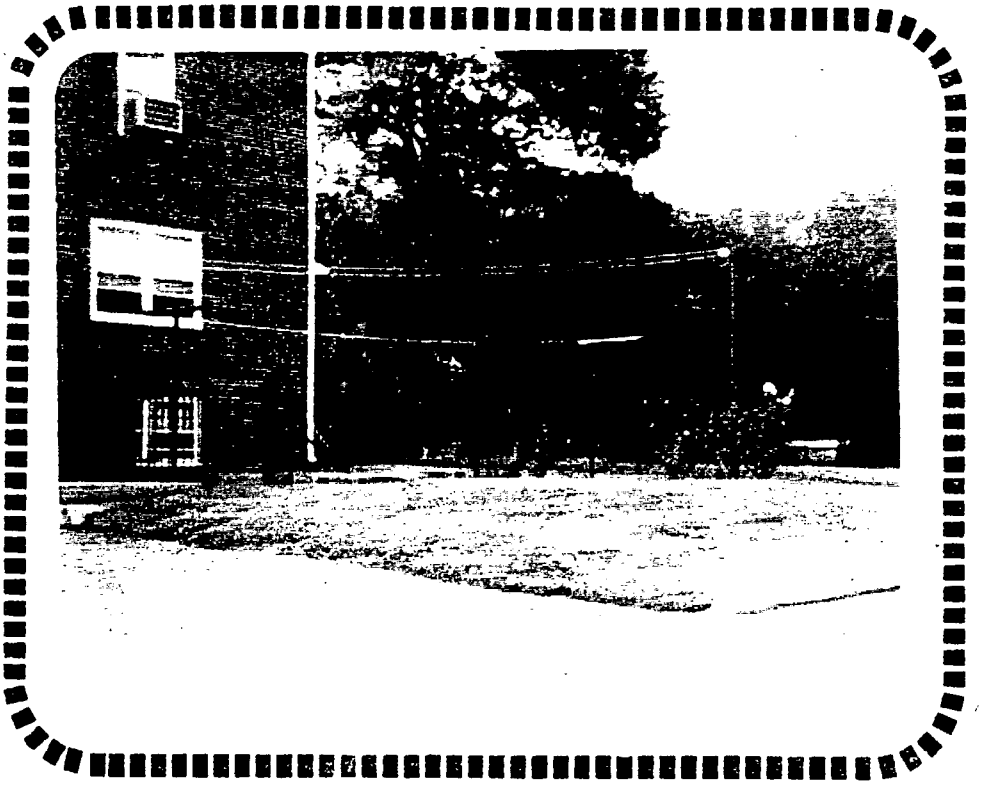
East Side of Rectory at Drake AVE.



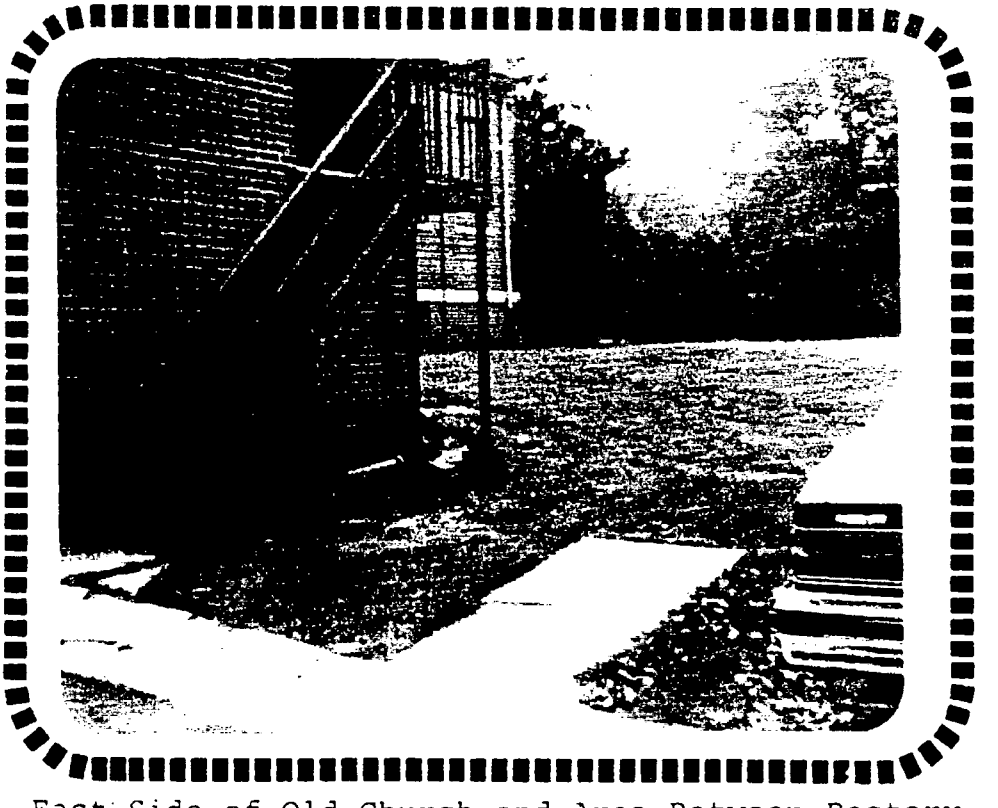
Southeast Corner of Rectory



Basement Entrance to Rectory Near S.E. Corner



South Side of Rectory



East Side of Old Church and Area Between Rectory and Old Church

West Side of Attached Garage at Rectory

REFERENCE NO. 26

DOE/OR/20722-27(Vol.1)
(DE85009915)

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-AC05-81OR20722

FINAL REPORT ON PHASE II REMEDIAL ACTION AT THE FORMER MIDDLESEX SAMPLING PLANT AND ASSOCIATED PROPERTIES

Middlesex, New Jersey

Bechtel National, Inc.
Advanced Technology Division

April 1985

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FINAL REPORT ON
PHASE II REMEDIAL ACTION
AT THE FORMER MIDDLESEX SAMPLING PLANT SITE
AND ASSOCIATED PROPERTIES

APRIL 1985

Prepared for

UNITED STATES DEPARTMENT OF ENERGY

OAK RIDGE OPERATIONS OFFICE

Under Contract No. DE-AC05-81OR20722

By

Bechtel National, Inc.

Advanced Technology Division

Oak Ridge, Tennessee

Bechtel Job No. 14501

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ACRONYMS

ACCU	Air Curtain Combustion Unit
AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
ANL	Argonne National Laboratory
ANSI	American National Standards Institute
ASEV	Assistant Secretary for the Environment
ASNE	Assistant Secretary for Nuclear Energy
BNI	Bechtel National, Inc.
CFR	Code of Federal Regulations
DOE	Department of Energy
EIC	Eberline Instrument Corporation
EPDM	Ethylene Propylene Diene Monomer
FBDU	Ford, Bacon & Davis Utah, Inc.
FUSRAP	Formerly Utilized Sites Remedial Action Program
ICRP	International Commission on Radiological Protection
MED	Manhattan Engineer District
MSP	Middlesex Sampling Plant
NEPA	National Environmental Policy Act
NJDEP	New Jersey Department of Environmental Protection
NRC	Nuclear Regulatory Commission
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
PMC	Project Management Contractor
RG	Regulatory Guide
TLD	Thermoluminescent Dosimeter

ABBREVIATIONS

BTU	British Thermal Unit
cm	centimeter
cm^2	square centimeter
cpm	counts per minute
dpm	disintegrations per minute
ft	foot
ft^3/min	cubic feet per minute
g	grams
gal	gallon
in.	inch
l	liter
m	meter
m^2	square meter
uCi/cc	microcuries per cubic centimeter
ug/l	micrograms per liter
mg/l	milligrams per liter
mi	mile
min	minute
ml	milliliter
mR	milliroentgen
uR/h	microroentgens per hour
mR/h	milliroentgens per hour
mrad	millirad
mrem	millirem
mrem/yr	millirem per year
pCi/cm^2/h	picocuries per square centimeter per hour
pCi/g	picocuries per gram
pCi/l	picocuries per liter
pCi/m^2s	picocuries per square meter per second
pCi/m^3	picocuries per cubic meter
s	second
yd^3	cubic yards
yr	year

1.0 SUMMARY

The former Middlesex Sampling Plant (MSP) and several adjacent and vicinity properties in Middlesex and Piscataway, New Jersey were designated in 1976 for remedial action under the Formerly Utilized Sites Remedial Action Program (FUSRAP). During the period 1943-55 uranium and thorium ores and concentrates were processed at the plant. Consequently, the plant site and several nearby properties were contaminated with radioactive residues. The primary purpose of FUSRAP is to decontaminate, stabilize, and/or dispose of wastes from former U.S. Army Corps of Engineers' Manhattan Engineer District (MED) and Atomic Energy Commission (AEC) sites in such a manner as to minimize radiological risks posed by the wastes and to permit certification of cleaned up sites for unrestricted future use.

In 1979 NLO, Inc. was named FUSRAP Project Management Contractor (PMC) for the U.S. Department of Energy (DOE) to initiate a multiphase program of remedial action at the former MSP. Phase I of the cleanup as well as the engineering and initial construction effort for Phase II were conducted by NLO, Inc.; at the start of FY 1982 (October 1, 1981) PMC responsibilities were assumed by Bechtel National, Inc. (BNI).

Phase I work comprised the construction of an impervious asphalt storage pad and drainage system at the former MSP site as well as decontamination of two properties adjacent to the site and three properties in the vicinity. Phase II involved cleanup of low-level radioactive waste that had migrated onto other properties adjacent to the site, the construction of an extension to the waste storage pad, and the installation there of a treatment system for rain runoff. All parcels were cleaned to the remedial action criterion level of 5 pCi/g radium-226 plus background specified by DOE. The effectiveness of the remedial action was corroborated by verification soil sampling, near-surface gamma measurement, and exposure rate measurement. In a subsequent phase or phases, the

wastes stored at the site will be removed for permanent disposal and the entire property decontaminated and decommissioned for unrestricted use.

Phase II field work began in July 1981 and was completed by mid-January 1982, except for several minor tasks completed later that spring. Work was completed within the planned schedule and original contract estimate.

This document describes the background to the Phase II remedial action, the parties involved in administering and executing it, the chronology of the work, verification of the adequacy of the remedial action, and the cost incurred. Volume 1 comprises an overall description of the project and remedial action activities. Details of the radiological measurements and analyses made for each parcel are presented in Volume 2. Supporting appendices are presented in Volume 3.

2.0 INTRODUCTION

In 1974 the AEC initiated a survey program to identify and radiologically characterize all formerly utilized MED and AEC sites involved with nuclear materials. Many of these sites are no longer operational, but remain contaminated with radioactivity and can be a potential source of exposure to the public. With the establishment of DOE in 1977, the responsibility for this survey program was assigned to the Assistant Secretary for the Environment (ASEV), who entitled it FUSRAP. Since mid-1979 FUSRAP responsibilities have been shared variously by the ASEV and the Assistant Secretary for Energy Technology [now Assistant Secretary for Nuclear Energy (ASNE)]. Effective in 1982 all major responsibilities (site identification, radiological characterization, determination of the need for remedial action, implementation of the remedial action, including waste disposal or stabilization of residual material, and post-remedial action certification) were consolidated and became the responsibility of ASNE.

Following identification of a site and determination of whether DOE has authority to undertake remedial action, radiological survey records are reviewed. If such data are lacking or incomplete, further surveys are conducted as necessary. The FUSRAP PMC and its subcontractors prepare a series of engineering studies and environmental reports for the site to evaluate remedial action alternatives. Documentation required by the National Environmental Policy Act (NEPA) as part of this evaluation is prepared by the Argonne National Laboratory (ANL). The action that is deemed appropriate by DOE based on the NEPA process evaluations is then implemented with consideration for public safety and in compliance with the Atomic Energy Act of 1954, as amended, and related Nuclear Regulatory Commission (NRC) or applicable federal, state, and local licensing requirements.

Phase II remedial action at the former MSP and associated properties was administered by DOE through its FUSRAP Lead Field Office, the Oak Ridge Operations (ORO) Office and FUSRAP PMC -- NLO prior to October 1, 1981 and BNI thereafter. The New Jersey Department of Environmental Protection (NJDEP) monitored Phase II activities to ensure public safety and assisted in soil sampling to confirm that cleanup had been achieved in accordance with applicable criteria.

3.0 SITE DESCRIPTION AND BACKGROUND

The former MSP is located in the Borough of Middlesex in north Middlesex County, New Jersey. The site lies just north of the Township of Piscataway, New Jersey as shown in Figure 3-1. It is bounded on the west by Mountain Avenue and to the north by the New Jersey Central and Lehigh Valley railroads.

The facility was a storage depot and processing plant for uranium ores received from the Belgian Congo between 1943 and 1955. In addition, lesser quantities of thorium ores and compounds as well as beryllium ores were sampled and stored at the facility until the site was closed in 1967, decontaminated to then-acceptable radioactive levels, and certified for unrestricted release.

At the request of the MED, the North Atlantic Division Engineers leased the first portion of the MSP property from American Marietta Company on November 1, 1943. Supplements to the lease were issued on May 15, 1945 and June 27, 1949 to include additional properties. Procedures for the U.S. Government to purchase the property were initiated on March 8, 1946, and the judgment of stipulation, filed on June 15, 1950, made the MSP the property of the U.S. Government. Easement rights for required drainage were obtained following the judgment of stipulation. The property was transferred to the AEC after its formation in 1946. In February 1968 the AEC officially reported the site as excess real property. The General Services Administration transferred it to the Department of the Navy, U.S. Marine Corps which used the site for reserve training from September 1969 to March 1979.

3.1 INITIAL DECONTAMINATION

Prior to transfer of the site to the General Services Administration, the AEC contracted with Isotopes, Inc., to decontaminate the site. The AEC conducted a followup survey, and additional decontamination was performed. This included

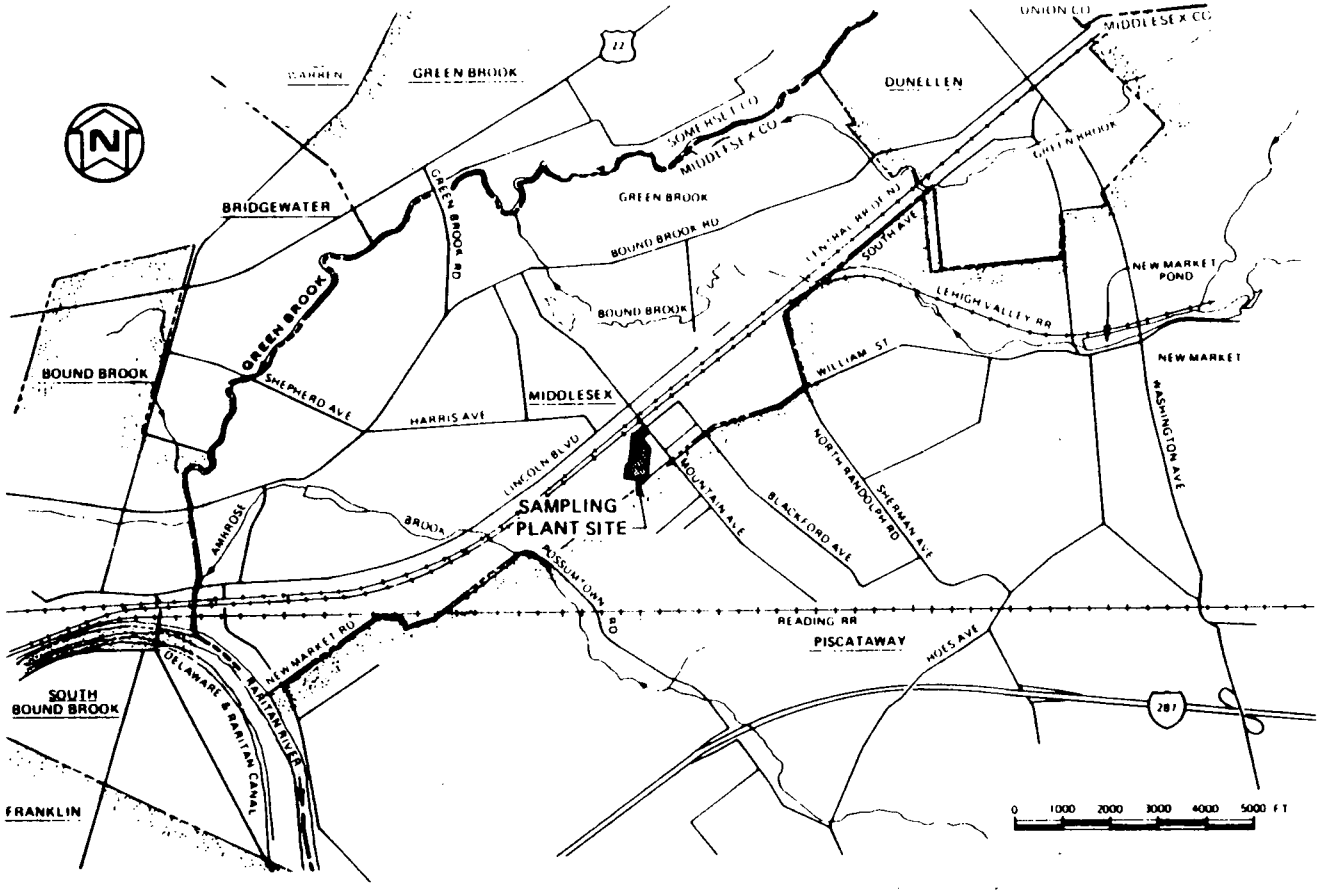


FIGURE 3-1 REGIONAL CONTEXT OF THE FORMER MIDDLESEX SAMPLING PLANT SITE, MIDDLESEX, NEW JERSEY

sandblasting, vacuuming, detergent and acid washing, concrete chipping, equipment removal, and, in cases of severe contamination, building member removal. Waste was transported by rail to the Nuclear Fuel Services licensed burial site at West Valley, New York. On September 2, 1967, upon completion of decontamination, DOE-ORO certified the site for unrestricted release.

The Oak Ridge National Laboratory (ORNL) resurveyed the site in April 1976. Off-site areas subject to contamination (due to wind and water transport) were resurveyed in May 1976. These radiological surveys included measurements of residual alpha and beta-gamma contamination levels, radon and radon-daughter concentrations in buildings, external gamma radiation levels, and radium concentrations in the soil. Results of the surveys were published in 1977 in Radiological Survey of the Middlesex Sampling Plant, Middlesex, New Jersey (DOE/EV-0005/1).

Surface contamination levels on the former MSP site exceeded guidelines presented in ANSI 13.12 (draft) and radon concentration levels exceeded the non-occupational limit (DOE Order 5480.1) in some structures. These results indicated the possible need for extensive radon and radon-daughter measurements in structures both on- and off-site.

An aerial survey was conducted for DOE by EG&G, Inc. between May 20 and May 27, 1978, and followup ground surveys were performed by ORNL. During these surveys additional properties not contiguous with the former MSP were identified as having been contaminated by material handled at the plant: a region in the vicinity of the rectory of the Our Lady of Mount Virgin Catholic Church, 650 Harris Avenue, Middlesex, New Jersey; and the private residence at 432 William Street, Piscataway, New Jersey. It was also confirmed that the Middlesex Municipal Landfill was contaminated with residual radioactive material from the former MSP. The surveys of these

properties are treated in Radiological Surveys of Properties in the Middlesex, New Jersey, Area (DOE/EV-0005/1 Supplement) and Radiological Survey of the Middlesex Municipal Landfill, Middlesex, New Jersey (DOE/EV-0005/20), respectively.

3.2 PHASE I REMEDIAL ACTION

Late in 1979 NLO, Inc. was designated by DOE to act as PMC for decontamination and restoration efforts at Middlesex. The work was planned as a multiphase project. During Phases I and II, contaminated materials from the site and associated properties would be consolidated and stabilized on-site. In a subsequent phase or phases this material would be removed to a permanent disposal site and the entire former MSP property decontaminated and decommissioned for unrestricted use.

During Phase I, a 3-acre asphalt-paved waste storage pad was constructed on the MSP site, two properties that had been backfilled with contaminated earth removed from the plant site during 1947 grading modification were decontaminated and restored, and the excavated material on the asphalt pad was covered with a reinforced, sealed cover of ethylene propylene diene monomer (EPDM). Three additional properties were added to the Phase I activities following additional radiological characterization performed by EG&G and Eberline Instrument Corporation (EIC). Phase I remedial action was conducted from early June to November 1980.

4.0 PHASE II PROJECT DEVELOPMENT

4.1 ORGANIZATION

The Phase II remedial action activities implemented at the former MSP were administered by the Technical Services Division of DOE-ORO although no permanent on-site DOE-ORO representative was assigned to Middlesex. NLO initially implemented the remedial action effort as the PMC for DOE.

BNI was selected by DOE early in 1981 as PMC for other FUSRAP work. The extent of BNI participation in the Middlesex Phase II remedial action was established by a memorandum of understanding between NLO and BNI in June 1981.

Staff of the NJDEP monitored Phase II activities and assisted during soil sampling for confirmation of compliance with criteria. The NJDEP also assisted NLO/BNI in contacts with the media.

EIC, an Albuquerque, NM firm that had provided radiological measurements and surveys during Middlesex Phase I operations, contracted with NLO to perform the radiological surveys and monitoring for Phase II. BNI subcontracted with EIC in May 1981 to perform these activities on all BNI FUSRAP sites.

BNI was assigned the role of PMC for the former MSP site on October 1, 1981. The applicable organization management charts for the periods before and after October 1 are shown in Figures 4-1A and B (Project Organization) and 4-2A and B (Field Organization).

4.2 RESPONSIBILITIES

NLO was responsible for managing the remedial action, including construction, and coordinating the work sequence through September 30, 1981. BNI assumed these responsibilities on

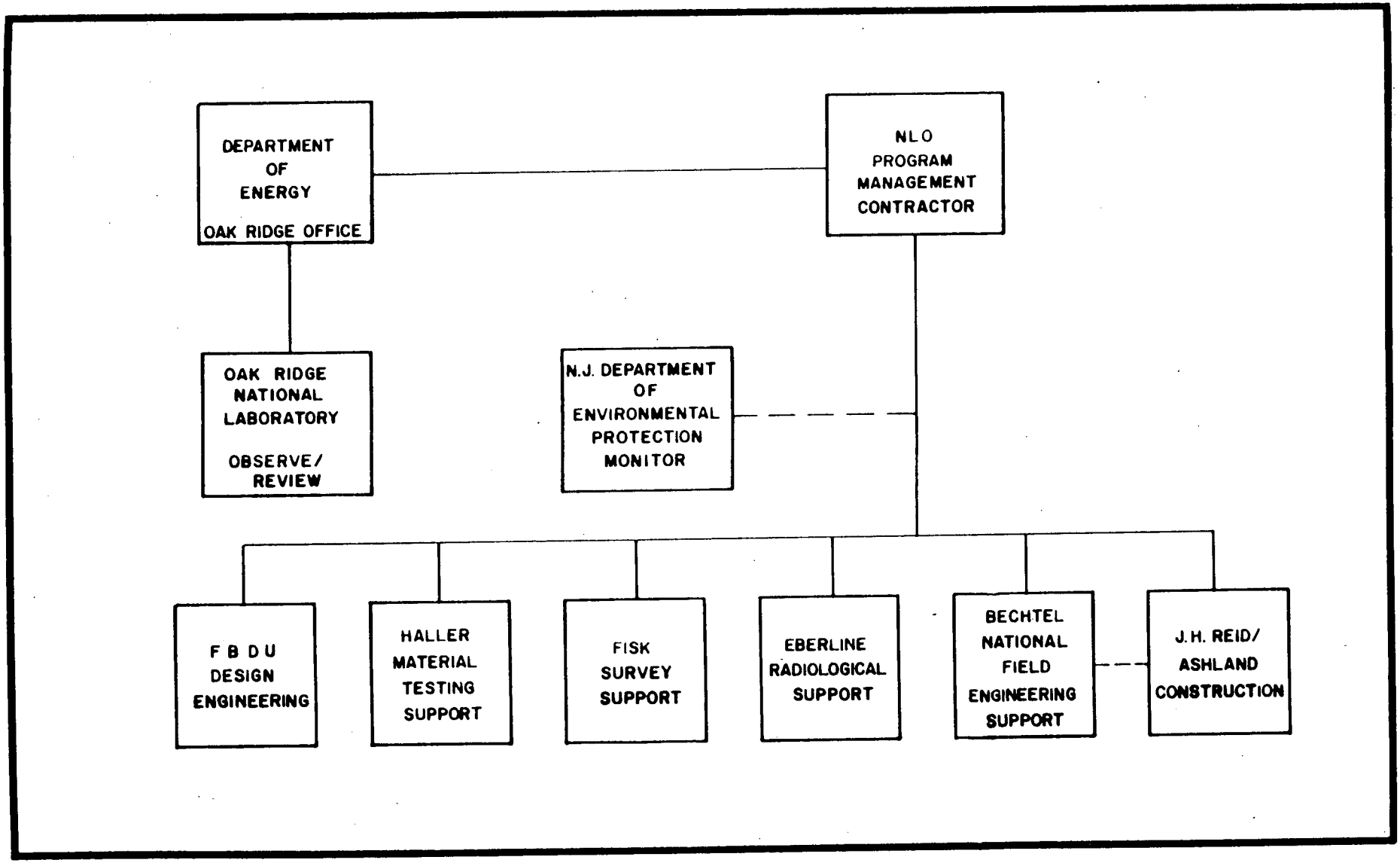


FIGURE 4-1A MIDDLESEX PHASE II PROJECT ORGANIZATION PRIOR TO OCTOBER 1, 1981

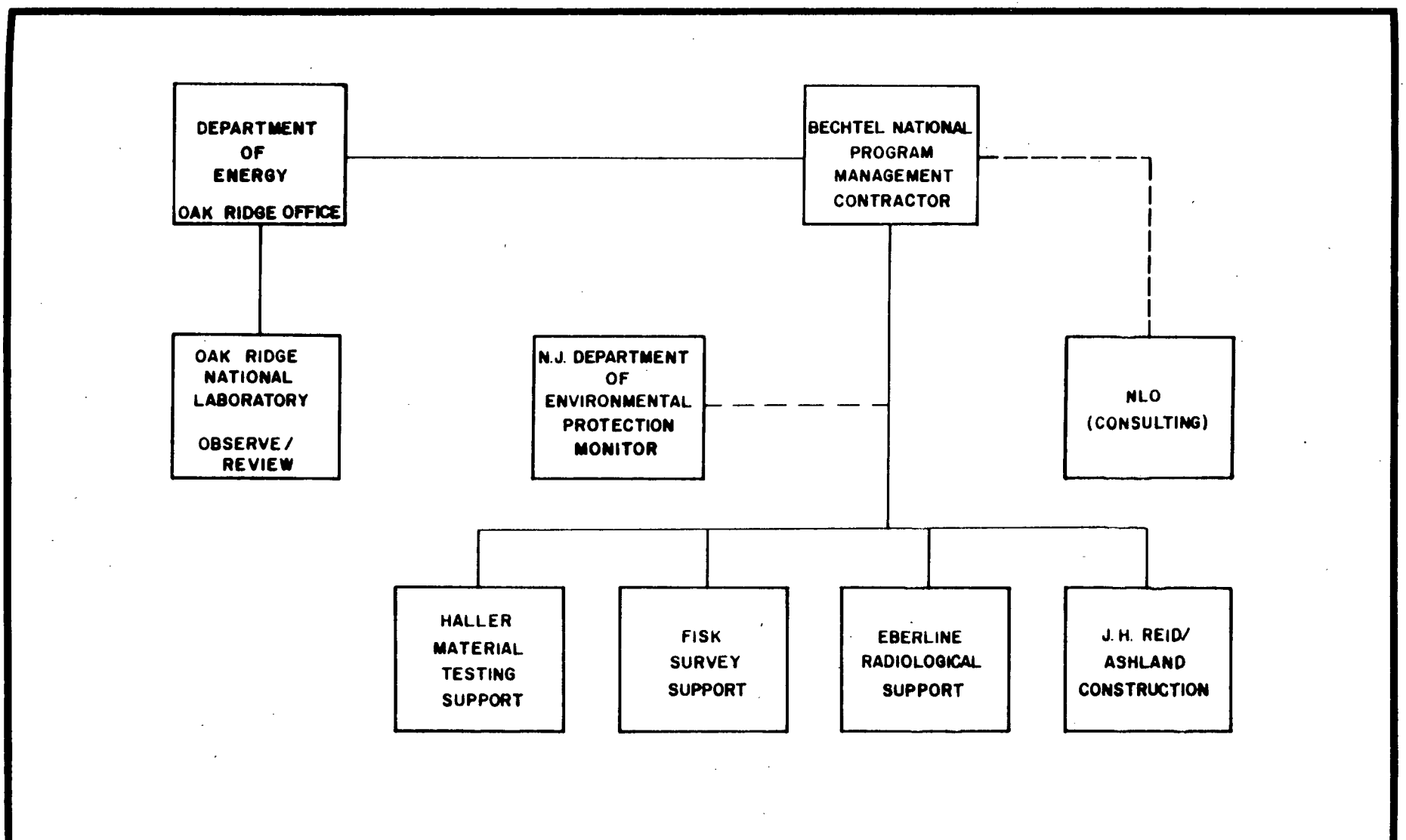


FIGURE 4-1B MIDDLESEX PHASE II PROJECT ORGANIZATION AFTER OCTOBER 1, 1981

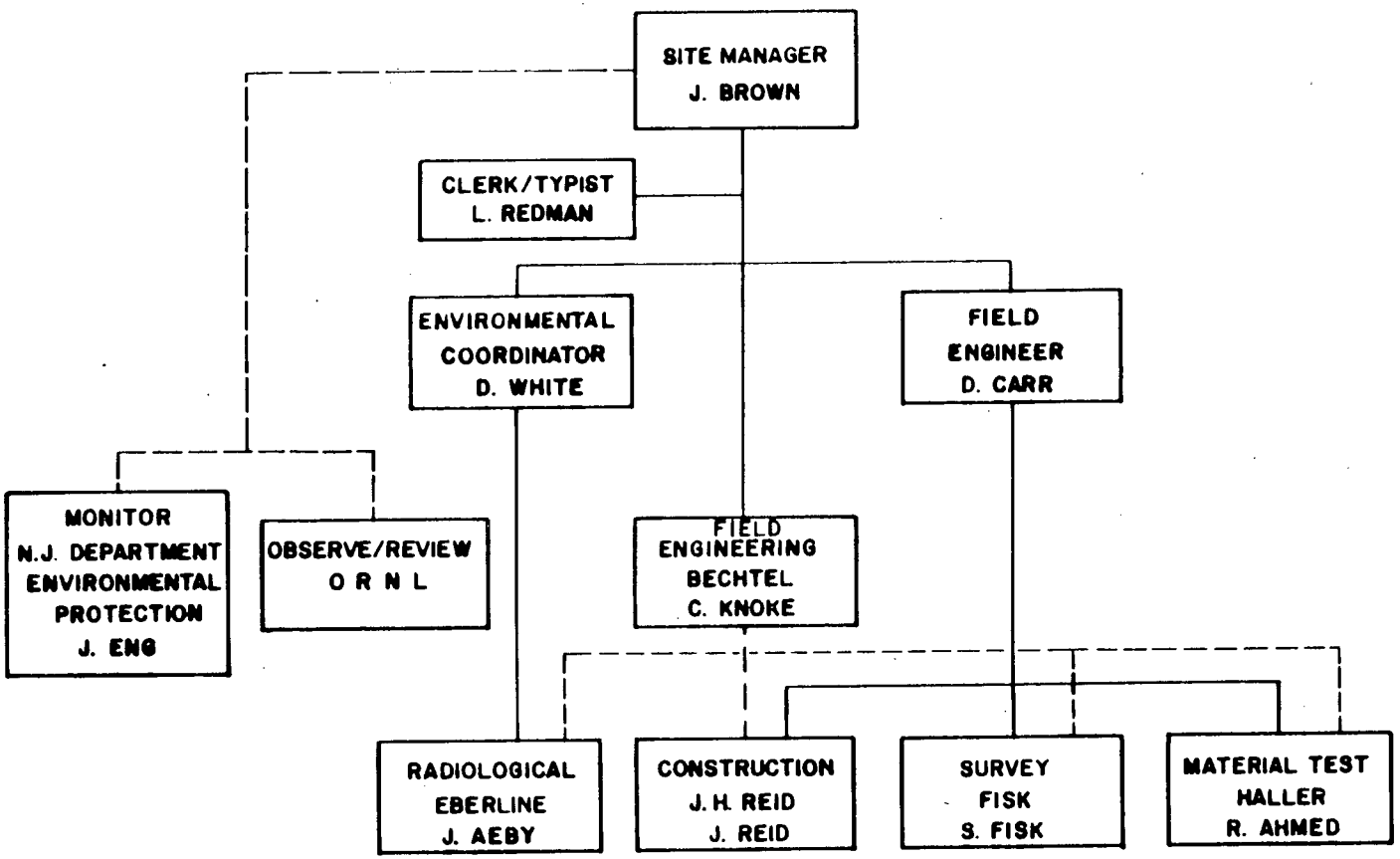


FIGURE 4-2A MIDDLESEX PHASE II NFO FIELD ORGANIZATION PRIOR TO OCTOBER 1, 1981

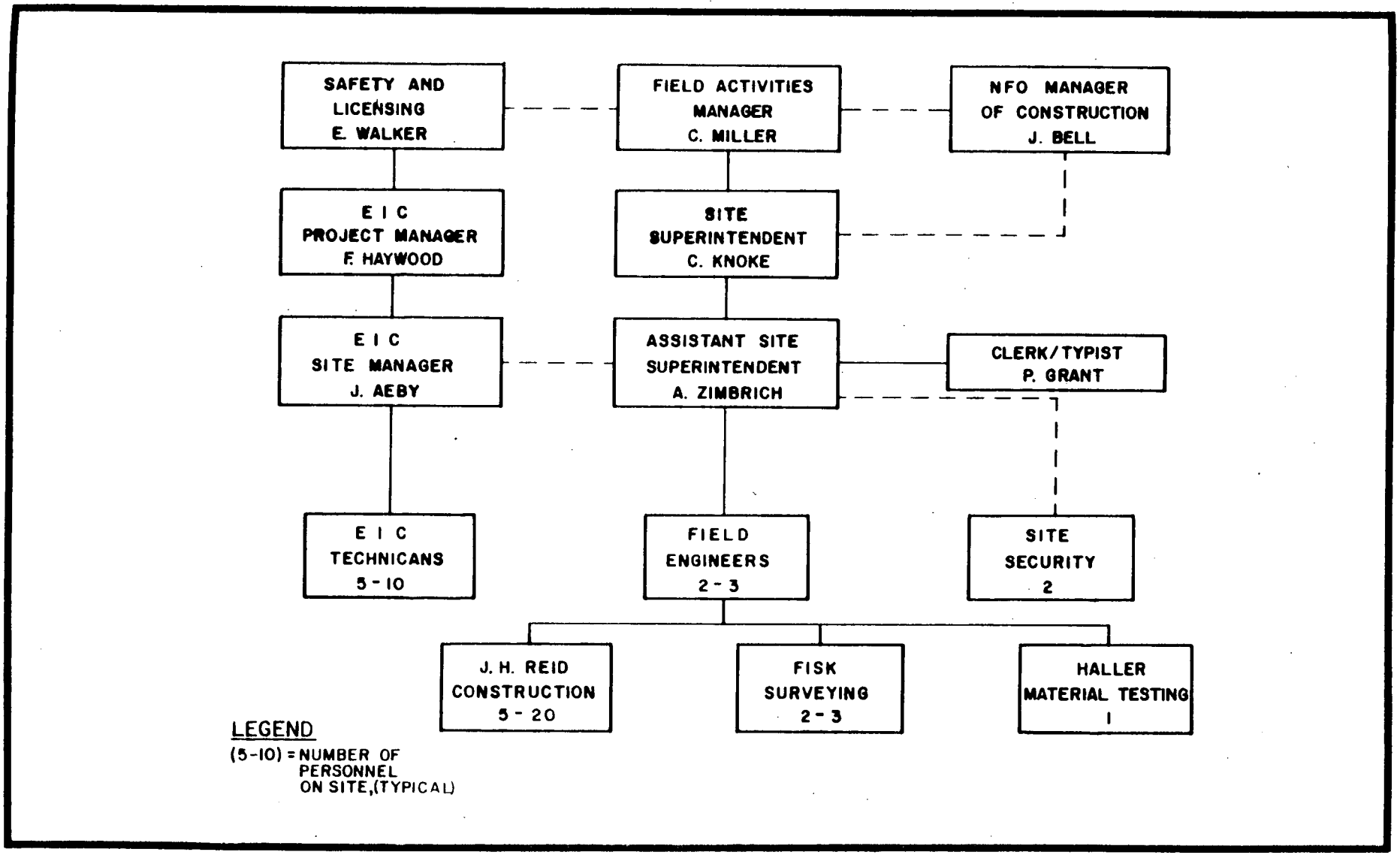


FIGURE 4-2B MIDDLESEX PHASE II BECHTEL FIELD ORGANIZATION AFTER OCTOBER 1, 1981

October 1, 1981. Prior to October 1, NLO/BNI were responsible for monitoring daily construction and excavation activities, interpreting the specifications and drawings, and guiding the construction subcontractor in performance of the work. The joint on-site field engineering staff prepared subcontract changes when deviations from specifications or the scope of work were required. In addition, the field engineering staff acted as DOE representatives in informing the public of work progress.

NLO/BNI also provided on-site environmental monitoring direction for the project. These duties included scheduling and coordinating construction and excavation operations with the necessary sampling and monitoring activities performed by EIC.

Subcontractors utilized by NLO and subsequently assigned to BNI in the Phase II remedial action are shown in Figures 4-2A and 4-2B. The functional responsibilities of each subcontractor are briefly discussed below.

4.2.1 Engineering Support

Ford, Bacon & Davis Utah, Inc. (FBDU) provided architect-engineering services for the design of Phase II, including drafting and preparation of technical specifications and plans.

BNI supported NLO in conducting and monitoring the daily construction and excavation activities. After October 1, 1981, BNI provided design engineering assistance as required.

4.2.2 Radiological Support

EIC provided complete health physics coverage, radiological consulting, radiological engineering/construction field support and environmental monitoring with complete documentation.

4.2.3 Construction

The Phase II remedial action construction subcontract was awarded to J. H. Reid, General Contractors/Ashland Construction, Inc., South Plainfield, New Jersey on the basis of competitive bidding. Reid/Ashland performed or sub-subcontracted all physical construction and excavation operations except for channelization of the Mosquito Control Ditch, which was performed by Tobar Construction Co., Inc., Morristown, New Jersey.

Blandford Land Clearing Corporation, Brooklyn, New York provided equipment and personnel to burn the organic material resulting from site clearing and building demolition.

4.2.4 Civil Surveying

Fisk and Associates provided civil surveying services during Phase II. These services included property surveys, establishing the location of the excavation limit, construction layouts, field layout of a 10-m grid, and measurement of the storage pile.

Prior to remedial activities on the associated properties, Fisk performed property surveys and established control points for the excavation activities. Property corners were identified in the field with iron pins which were then also used as control points for the restoration work on the individual parcels.

Construction layouts included locating and staking new construction items, such as storm drains, water lines, drainage ditches, the perimeter fence, and the settling basin.

The 10-m grid, utilized by EIC as a reference for confirmatory sampling after contaminated soil had been removed, is referenced to the New Jersey State Plane Coordinate System, thereby establishing the exact location of all soil samples.

The size of the storage pile of contaminated earth was measured by taking cross sections; the volume was computed from cross section measurements.

4.2.5 Materials Testing

Haller Testing Laboratories, Inc. of Plainfield, New Jersey provided soils, asphalt, and concrete testing services related to the remedial action.

4.2.6 Radon Monitoring

Mound Laboratories was under contract with DOE-Headquarters, Office of Operation Safety, to provide radon monitoring at the former MSP and associated properties.

4.3 ARCHITECT-ENGINEER PLANNING

In December 1980 the NLO Decontamination and Decommissioning (D&D) division initiated work on Phase II of the Middlesex decontamination effort. With the assistance of FBDU, NLO formulated the necessary engineering plans and quality assurance assessments and began preparation of specifications and drawings for remedial action subcontracts. In January 1981 FBDU obtained information needed for design work on the storage pad extension and for stream diversion south of the site. FBDU also provided updated ownership information to NLO for initial processing of Memoranda of Agreement with property owners.

Discussions were held with DOE and other interested parties regarding the necessity of installing interception ditches and laterals in the swampy area south of the site. Use of several 500-ft open channel sections to direct Main Stream temporarily around the decontamination activities was considered essential to prevent any possible widespread migration of radioactive material during Phase II activity.

It was also recognized that problems could arise in the area south of the former MSP during decontamination of the south drainage ditch area. The anticipated problems associated with excavation in this area were:

- Containment of wet materials which could ultimately lead to cross-contamination
- An unsuitable base for construction.

FBDU proposed to install ditches at key locations in this area to intercept subsurface water and divert surface runoff away from the proposed decontamination zone. It was estimated that a minimum of 4 months would be required to dewater this area sufficiently to allow the trenches to curtail the inflow of the ground and surface water and to allow vegetation to absorb the remaining moisture. Because of the time-sensitive nature of these activities, a construction firm already under contract with DOE-ORO, Tobar Construction, performed the work, facilitating its timely completion.

The existing above-ground settling tanks controlling the storage pad water runoff were considered inadequate for Phase II and post-Phase II water control. NLO directed FBDU to design a new on-site gravity-operated concrete settling basin to handle the maximum flow expected during the anticipated maximum lifetime of the storage pad.

FBDU proposed, and NLO approved, the installation of a slurry wall barrier of fine-grained soil such as bentonite around the former MSP between it and the off-site properties to prevent migration of underground water carrying radioactive materials. NLO approved this proposal. However, it was still necessary to maintain an effective groundwater monitoring system during Phase II activities and thereafter. Additional sampling wells were planned so that an improved monitoring program could be implemented.

4.4 MEMO AGREEMENTS

Prior to implementation of the remedial action, it was necessary for DOE to obtain agreements with the individual property owners authorizing entry and work. The agreement, designated a Memo Agreement, granted DOE and its contractors the right to perform the remedial action. It also stated the scope of work, DOE responsibilities, and the plan to restore the properties to an "as was" condition. Several agreements were revised to incorporate owner-requested changes in the restoration plans, and two landowners received compensation for the assessed valuation of personal property removed but not replaced. An amended agreement was prepared for Parcel 7 to include the lessee who is operating a business on this property.

During remedial action several property owners requested changes in the restoration plan. These were implemented if the change was not considered a "betterment" and did not increase the cost to DOE of restoring the property.

4.5 BID PREPARATION

The bid package for the storage pad extension and Phase II remedial action on adjacent off-site properties was issued on March 27, 1981. Four bulletins modifying the bid package were issued to bidders after this date. These were as follows:

- Bulletin #1, issued April 16, 1981, extended the bid opening by one calendar week to May 4, 1981. It also included drawing revisions and specification changes (Addendum A).
- Bulletin #2, issued April 24, 1981, modified the specification further by revisions to the basic contract, presented in Addendum B.
- Bulletin #3, issued April 28, 1981, postponed the bid opening for an undisclosed period.
- Bulletin #4, issued May 2, 1981, revised the bid opening date to May 18, 1981.

Eight bids ranging from $1,356,644.00 to $4,005,985.00 were received; the subcontract was awarded to the lowest bidder, J. H. Reid General Contractor/Ashland Contractors, Inc. Notice to proceed was given on June 30, 1981.

5.0 PHASE II REMEDIAL ACTION

5.1 PROJECT DESCRIPTION

The NLO/FBDU design effort established the following tasks as required for the Phase II remedial action:

- o Improvements to and expansion of storage facilities for contaminated earth
  - Extension of the Phase I asphalt storage pad 260 ft to the north
  - Drilling eight new groundwater monitoring wells around the storage pad
  - Alteration of the cross sections and riprapping of the south drainage ditch and Main Stream through the excavation area to accommodate a probable maximum flood
  - Construction of a 155 ft x 16 ft x 8-1/2 ft deep concrete clarifier and a flocculator system to facilitate the sedimentation of suspended solids in the runoff from the asphalt pad
  - Erection of 3,000 ft of 7-ft-high vinyl-coated chain link security fence surrounding the former MSP site.
- o Removal of contaminated earth from thirty-four parcels of land adjacent to the site
- o Restoration of these parcels.

The area in which remedial action was performed is shown on Figure 5-1. It includes residential, commercial, industrial, and unimproved lands. The buildings on these properties were not contaminated. Measurements showed that contamination was primarily limited to the ground surface, indicating that wind and water were the primary modes of transport from the former MSP. Spread of radioactive material also resulted from physical transportation of soils during previous construction and demolition at the site.

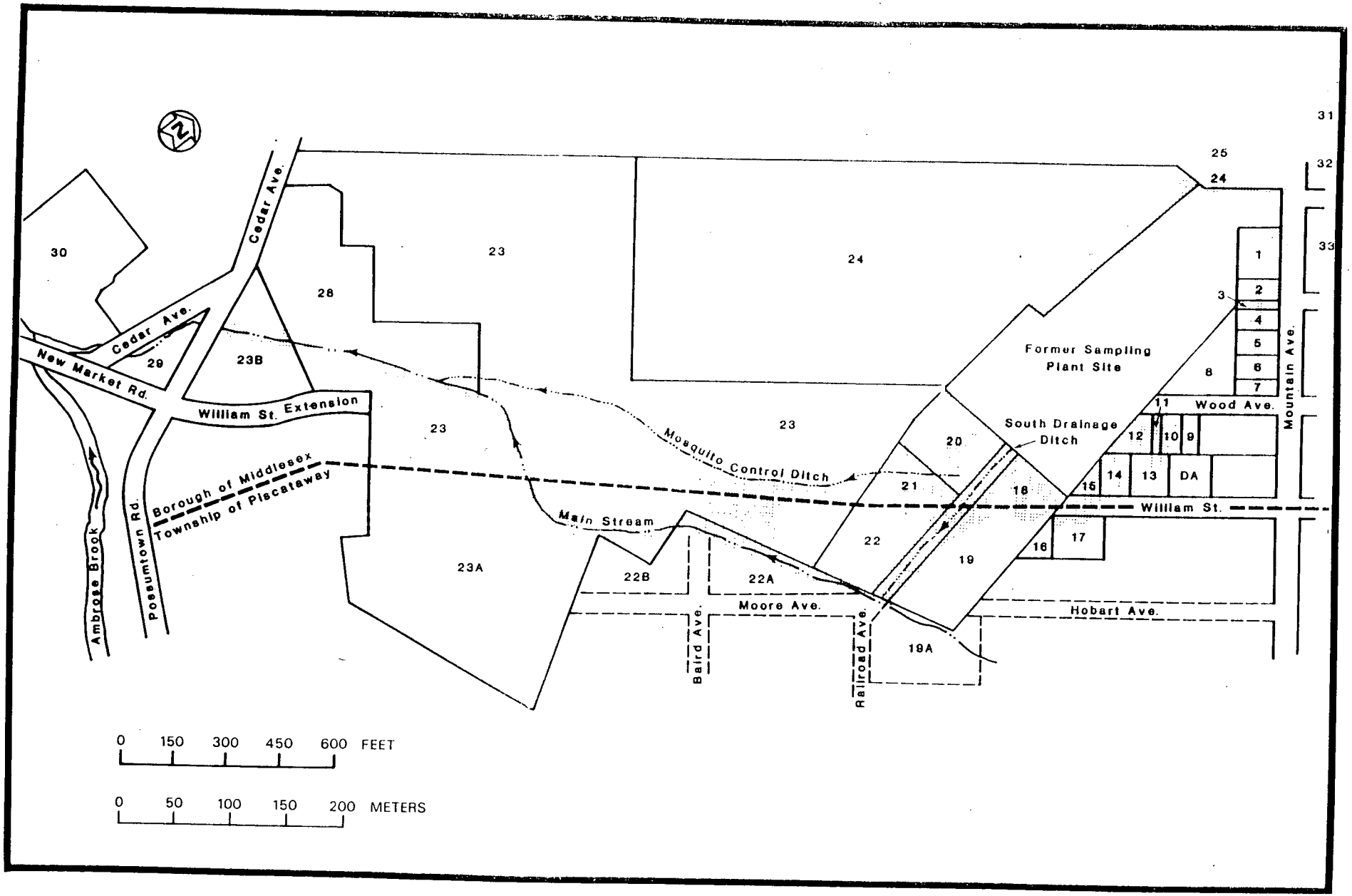


FIGURE 5-1 MAP OF THE MIDDLESEX PHASE II REMEDIAL ACTION PROPERTIES

During Phase II field radiological testing established that no remedial action was necessary on Parcels 7, 9, 29, 30, and 33 (see Volume 2 of this report). This was determined by scanning these parcels on a 10-m grid in accordance with standard verification procedures and by testing soil samples. Results showed that the average concentration of radium in soil on these parcels was less than the criterion of 5 pCi/g above ambient background (1 pCi/g) that had been specified by DOE as the applicable guideline for remedial action at Middlesex. The remaining parcels initially designated to receive remedial action during Phase II were duly decontaminated and restored.

Properties south of the site are in a wooded area that serves as a drainage basin for the vicinity. Most of the excavation occurred in this area. A drainage ditch flows past the south end of the site and thence 600 ft to Main Stream. Main Stream flows southwesterly past the site (Figure 5-1) through a heavily wooded area for approximately 2,800 ft before joining Ambrose Brook.

Contaminated soil was removed and transported from the adjacent and vicinity properties, including the abovementioned wooded drainage area, and placed on the storage pad at the former MSP. The storage pad was designed to provide a base for the storage of contaminated material for a service life of 20 years.

Stored material was subsequently covered with a barrier to control radon emissions and erosion. EPDM fabric was chosen for the cover based on past experience with the material. EPDM has good weathering characteristics and can attenuate approximately 98 percent of radon generated by the radium-contaminated materials.

The impermeable bentonite slurry wall barrier, originally intended to encircle the plant site, was deleted from the remedial action plan. It was believed that a potential buildup of pressure in

trapped groundwater could cause water to hemorrhage through the asphalt pad or overtop the pad and escape at the south end of the site.

To improve the groundwater monitoring system eight additional wells were drilled (four deep and four shallow) during Phase II by Cooper & Hipp, Somerville, New Jersey, a sub-subcontractor to J. H. Reid/Ashland. Drilling was done at the approximate locations established by FBDU.

Phase I wells had been cased only to the alluvium/shale interface under the assumption that only a nominal amount of residue could enter the hole below the casing. This assumption, however, did not take into account the considerable truck traffic in the area during Phase I. Due to continual vibratory and impact loading near the wells, silting and/or caving in of certain Phase I wells occurred. Consequently, wells drilled during Phase II were cased the entire length, grouted, backfilled, and provided with filter screens to prevent siltation.

Due to the close proximity of the wells to Phase II vehicular traffic and the extensive repairs to the Phase I wells necessitated by excavation activity, all on-site monitoring wells were provided with 2 ft x 2 ft x 18 in. deep concrete vehicle barriers to reduce the potential for damage.

These barriers were installed shortly after each well was cased. The locations of existing Phase I and Phase II wells are presented in Figure 8-1 (page 81).

5.2 REMEDIAL ACTION ACTIVITIES

The procedures developed by NLO for implementation of Phase I remedial action were followed during Phase II. Phase II operations required moving a minimum quantity of soil, yet meeting decontamination criteria; preventing further spread of contamination

by equipment; minimizing disturbance to residents; and reducing soil erosion and dust generation. Each operation was performed in a manner that minimized the health hazard to the workers as well as to residents.

Field activities were initiated in early June 1981. A soil sample processing facility and testing laboratory were to set up to analyze samples and to prepare, identify, package, and ship them to a central laboratory for confirmation of on-site analysis results. Access control facilities were mobilized, and a contamination control point was established to monitor and ensure containment of contaminated material within the storage area. Management field offices were set up to administer the construction subcontract and to monitor all remedial action activities.

Preliminary surveys and field staking of actual contamination limits (the 5 pCi/g isoline) were completed in late June 1981. In July 1981 DOE held a project readiness meeting with NLO and BNI to ensure that the Phase II remedial action plan was ready so that excavation could begin.

5.2.1 Equipment

NLO/BNI specified that the subcontractor use equipment in good working condition to ensure that operations would proceed with the minimum of delay and hazard to workers and to the public. Excavation around the residences was greatly expedited by use of a Caterpillar C-235 backhoe versus a much smaller model (see Figure 5-7, page 33). Dump trucks to be used were carefully inspected to identify those with gaps around the tailgate large enough to leak soil and the necessary modifications were made by J. H. Reid. A list of equipment used by the subcontractor during the remedial action is provided in Table 5-1.

TABLE 5-1

EQUIPMENT USED BY REID/ASHLAND FOR MIDDLESEX PHASE II REMEDIAL ACTION

ITEM	MAKE	MODEL	QUANTITY	REMARKS
Backhoe/Loader	Dyna-Hoe	160	1	Also
Backhoe/Loader	John Deere	-	1	1 Farm disc
Backhoe	CAT	235	1	1 Landscaping rake
Backhoe	CAT	245	1	2 Plate tampers
Backhoe	Bucyrus-Erie	-	1	2 Plate tampers
Bulldozer	CAT	D-3	1	
Bulldozer	CAT	D-4	1	
Bulldozer	CAT	D-5	1	
Loader	CAT	950	1	NOTE: Does not include sub-subcontractor equipment.
Loader	CAT	960	1	
Loader	John Deere	410	1	
Loader	CAT	977L	1	
10 Wheel Dump Truck	Mack/Autocar	18 yd^3	6	
6 Wheel Dump Truck	Ford	350/600/750	1/2/1	
18 Wheel Dump Semi-Truck	Mack	20 yd^3	1	
Paver	Blaw-Knox	-	1	
Slip Form Paving Machine	-	-	1	
Self-Propelled Sheepsfoot Roller	Hyster	14 ton	1	
Self-Prop Vib Roller	Rex	8 ton	1	
Self-Prop. Roller	Hyster	1.5 ton	1	
Self-Prop. Roller	Hyster	10 ton	1	(Paving Roller)
Chipper	Woodchuck	-	2	
Mulcher	Woodchuck	-	1	
Track-mounted Crane	Bucyrus-Erie	25 ton	1	
Air Compressor	-	-	2	250 ft^3/min

5.2.2 Excavation

Contaminated soil was removed to the extent necessary to comply with the criterion of 5 pCi/g radium-226 above background. The extent of the surface contamination was initially defined by ORNL in 1976, confirmed by EG&G in 1980, and further characterized during remedial action by soil core analyses performed by EIC to evaluate the depth of contamination.

Cores were obtained and excavation was conducted in a manner that minimized the spread of contamination. A total of 25,742 yd^3 of contaminated soil was excavated. Excavation activities proceeded in the following order:

1. Residential parcels along Mountain Avenue
2. Wooded property between Wood and William Streets
3. Residence on Parcel 17 and William Street roadbed
4. South drainage area
5. Main Stream area.

A radiological technician with a scanner followed the excavating equipment to determine radioactivity levels. Excavated material was pulled toward contaminated areas to avoid spreading contamination onto clean areas.

5.2.3 Transportation of Contaminated Excavated Material

Once loaded, dump trucks were covered with heavy canvas tarpaulins before leaving the area. From the work areas to the dump site, trucks followed routes designed to minimize exposure to the general public. The only public streets traveled were the westerly portions of Wood and William Streets. Haul routes are shown in Figure 5-2.

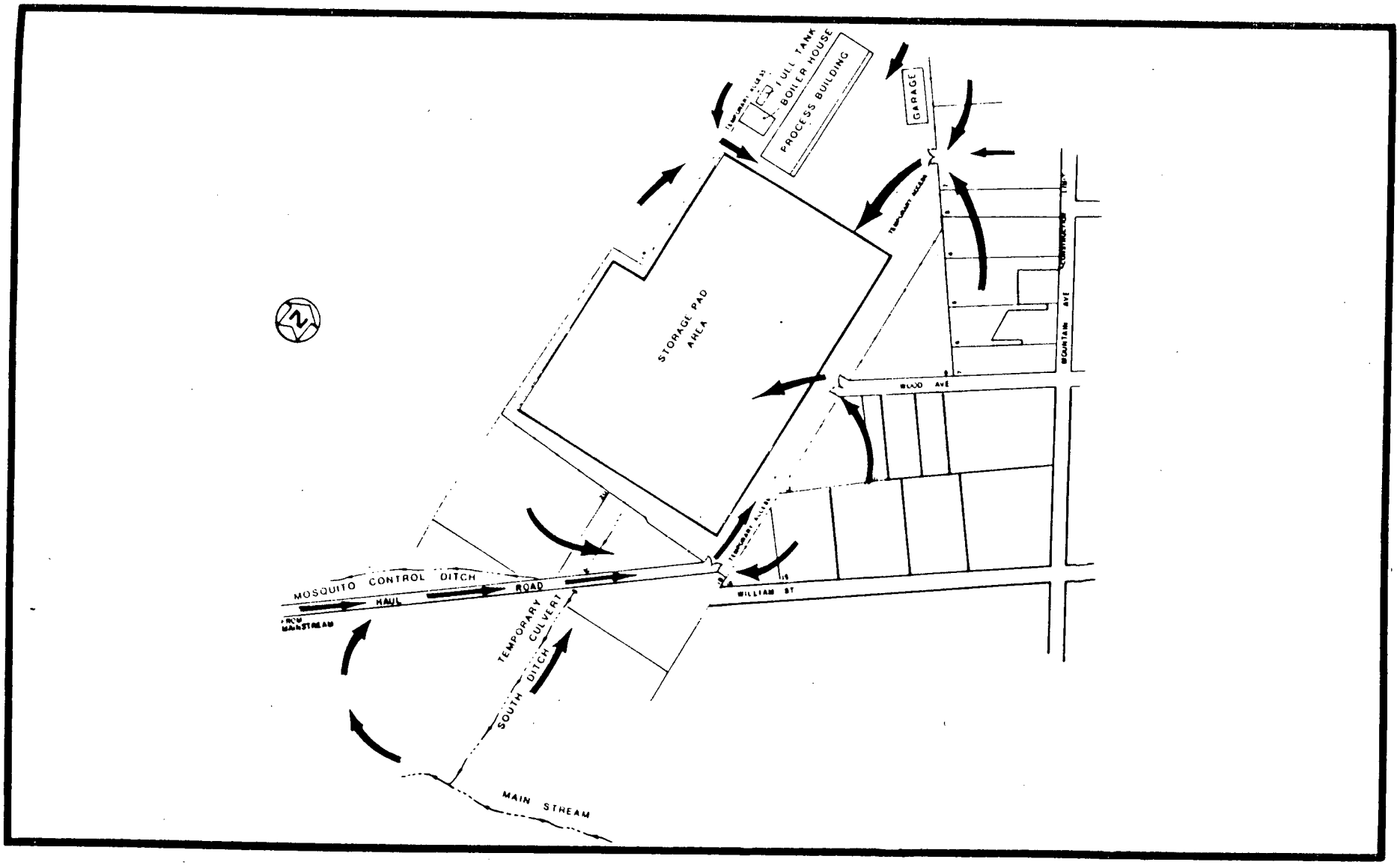


FIGURE 5-2 HAUL ROUTES USED DURING PHASE II REMEDIAL ACTION

At the plant site, the material was dumped directly onto the storage pile. The in situ moisture content of the excavated soils, the continual compacting of the storage pile, and the use of a temporary plastic cover reduced dust generation and the spread of contaminants due to erosion. Upon completion of the dumping operation, the trucks left by the same routes. If a truck was to be moved off designated haul routes, it was thoroughly scanned for external radiation by an EIC technician. If radiation levels were above criteria, the truck was washed down on the site. The truck was then logged out and released through the site access control point.

5.2.4 Compaction of the Pile

The bulk of the soils excavated during Phase II were free of large rocks or other hard/sharp material. A 2-ft layer of homogeneous soil was placed upon the asphalt pad and compacted first. Concrete and other debris were then added to the storage pile and compacted to 95 percent Standard Proctor density.

Earthmoving equipment working on the pile transported the contaminated material to appropriate locations on the pile, which was continuously compacted to ensure its structural integrity and to meet compaction criteria. Upon completion of the excavation operation, the storage pile was rough-graded to meet side slope requirements. In preparation for the cover, the pile was hand raked to produce a surface that was firm, planar, and free of debris, stones, or sticks that could chafe or puncture the EPDM cover.

5.2.5 EPDM Cover Installation

Reid/Ashland installed the EPDM in consultation with Conti Construction, the Phase I contractor, and Carlisle, the EPDM manufacturer. First, a 3-ft wide perimeter tuck piece was bonded to the asphalt pad with cement. The edge pieces and border timbers were then spliced, cemented, and bolted together. The remainder of the liner was then placed. Each lap splice was cleaned with

unleaded gasoline prior to the addition of the jointing cement, per manufacturer's instructions. A minimum 6-in. lap was maintained for every splice. Upon completion of the splice, a lap sealant was applied to improve the integrity of the cemented lap splice.

5.2.6 Incineration of Combustible Materials

By-products of the Phase II remedial action included approximately 1,600 yd^3 (loose measure) of organic material, including wood chips, railroad ties, poles, and tree stumps. This organic material posed several problems: 1) It was deemed unsuitable for incorporation into the storage pile on the premise that decomposing organic material under elevated temperatures and moisture could produce toxic gas buildup beneath the impermeable covering, 2) the material was considered radioactive and therefore could not be moved to a sanitary landfill, and 3) since ocean disposal of the contaminated soils remains a possibility for final disposition, buoyant organic material could not be included in the storage pile. Consequently, all organic materials were incinerated using an air curtain combustion unit (ACCU) approved by the State of New Jersey for such operations. The volume of soil and ashes remaining after incineration was approximately 340 yd^3. This was deposited on a 50 ft x 80 ft EPDM mat and covered with EPDM that was sealed to the base sheet.

Incineration operations were performed on six days during January 1982. They were monitored by the NJDEP Radiation Control and Air Pollution Divisions, the Piscataway Board of Health, and the Middlesex fire department, police, and mayor's office. Monitoring conducted by EIC during incineration operations is detailed in Subsection 6.5.

5.2.7 Schedule

Excluding incineration of combustibles and other minor items, Phase II field work was completed between July 15, 1981 and

December 23, 1981. The planned and actual Phase II schedules, including milestones are illustrated in Figure 5-3.

Significant activities performed during each month were as follows:

July, 1981

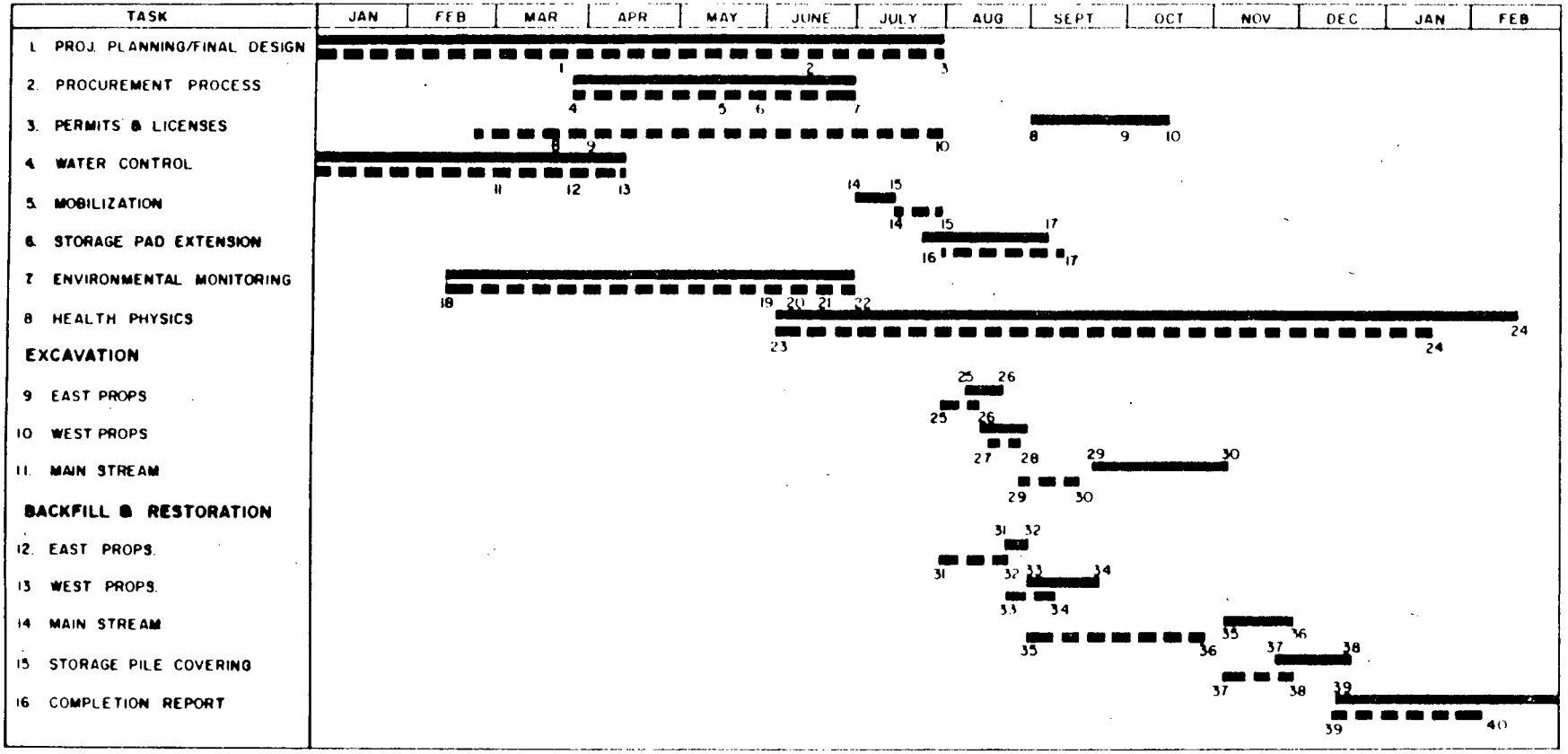
- Demolition of the thaw house in preparation for storage pad extension (Figures 5-4 and 5-5).
- Clearing of parcels 1 through 6.
- Drilling of eight monitoring wells.
- Removal of five underground storage tanks and demolition of the block wall on the east side of the plant. These activities began in July and were completed in early August (Figure 5-6).

August - September 1981

- Clearing and grubbing of parcels located in the south drainage basin were completed in mid-August. The eight acres of land surrounding Main Stream (Figure 5-1) were cleared during the latter part of August.
- Piping for storage pad/site drainage was installed during August.
- New gutters for extension of the storage pad were installed.
- Excavation of parcels 1 through 6 and 9 through 17 (Figure 5-1) was completed (Figure 5-7).
- Construction of a new clarifier began (Figures 5-8 and 5-9).
- Backfill of parcels 1 through 6 was completed.

October - November 1981

- Reseeding and sodding of lawns on residential parcels were completed (Figures 5-10 and 5-11).
- Excavation, backfilling, and restoration of south drainage area were completed.



1 MARCH 27,1981 DRAINAGE & SPECIFICATIONS COMPLETE 3/27/81
2 JUNE 15,1981 QUALITY ASSURANCE PLAN COMPLETE 6/15/81
3 AUG 1,1981 PROJECT MANAGEMENT PLAN COMPLETE 8/1/81
4 MARCH 27,1981 ISSUE IFB 3/27/81
5 MAY 18,1981 RECEIVE BID EVALUATION 5/18/81
6 MAY 28,1981 AWARD RECOMMENDATION (NCD) 5/28/81
7 JUNE 30,1981 AWARD CONTRACT (ROD) 6/30/81
8 MARCH 20,1981 APPLICATIONS PREPARED 4/22/81
9 MARCH 27,1981 FILING COMPLETED 4/30/81
10 AUG 1,1981 PERMITS/LICENCES ISSUED 8/1/81
11 MARCH 01,1981 PLANNING COMPLETE 3/1/81
12 APRIL 6,1981 CONSTRUCTION STARTED 4/6/81
13 APRIL 15,1981 CONSTRUCTION COMPLETE 4/15/81
14 JULY 15,1981 MOBILIZATION STARTED 7/1/81
15 JULY 24,1981 MOBILIZATION COMPLETE 7/15/81
16 JULY 29,1981 STORAGE PAD EXTENSION START 7/27/81
17 SEPT 5,1981 STORAGE PAD EXTENSION COMPLETE 8/31/81
18 FEB 15,1981 ISSUE SOLE SOURCE IFB 2/15/81
19 JUNE 1,1981 AWARD CONTRACT 6/1/81
20 JUNE 8,1981 FIELD MONITORING STATIONS SET UP 6/8/81
21 JUNE 1,1981 FIELD LAB ESTABLISHED 6/22/81
22 JUNE 1,1981 RESOURCES & WORK PROCESS PLAN 6/29/81
23 JUNE 01,1981 HEALTH PHYSICS START 6/29/81
24 JULY 01,1981 HEALTH PHYSICS COMPLETE 8/31/81
25 AUG 3,1981 EAST PROPERTY EXCAVATION START 8/3/81
26 AUG 14,1981 EAST PROPERTY EXCAVATION COMPLETE 8/24/81
27 AUG 17,1981 WEST PROPERTY EXCAVATION START 8/17/81
28 AUG 28,1981 WEST PROPERTY EXCAVATION COMPLETE 9/2/81
29 AUG 31,1981 MAIN STREAM EXCAVATION START 9/1/81
30 SEPT 01,1981 MAIN STREAM EXCAVATION COMPLETE 10/1/81
31 AUG 31,1981 EAST PROPERTY BACKFILL START 8/29/81
32 AUG 31,1981 EAST PROPERTY BACKFILL COMPLETE 9/2/81
33 AUG 24,1981 WEST PROPERTY BACKFILL START 9/2/81
34 SEPT 11,1981 WEST PROPERTY BACKFILL COMPLETE 9/21/81
35 SEPT 7,1981 MAIN STREAM BACKFILL START 11/4/81
36 OCT 23,1981 MAIN STREAM BACKFILL 11/24/81
37 NOV 9,1981 STORAGE PILE COVERING START 11/9/81
38 NOV 27,1981 STORAGE PILE COVERING COMPLETE 12/29/81
39 DEC 15,1981 COMPLETION REPORT START 1/4/82
40 FEB 5,1982 COMPLETION REPORT

ACTUAL

PLANNED

FIGURE 5-3 MIDDLESEX PHASE II MASTER SCHEDULE

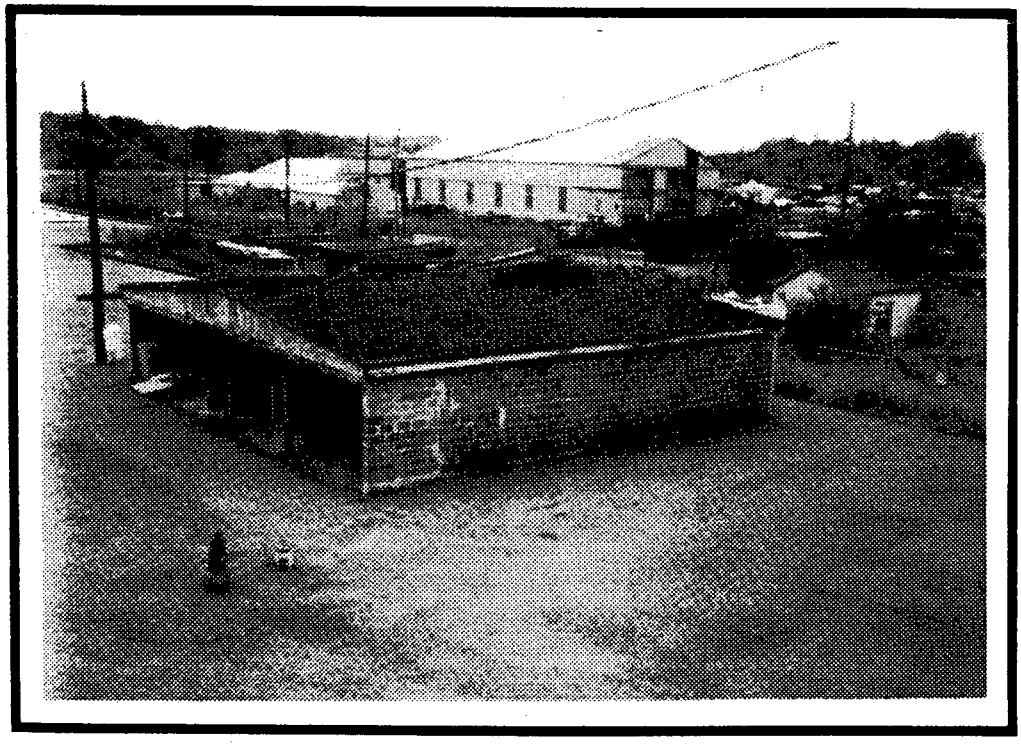


FIGURE 5-4 AERIAL VIEW OF THE THAW HOUSE PRIOR TO DEMOLITION

FIGURE 5-5 DEMOLISHED WALL OF THE THAW HOUSE

FIGURE 5-6 REMOVING STORAGE TANKS FROM THE FORMER MSP SITE

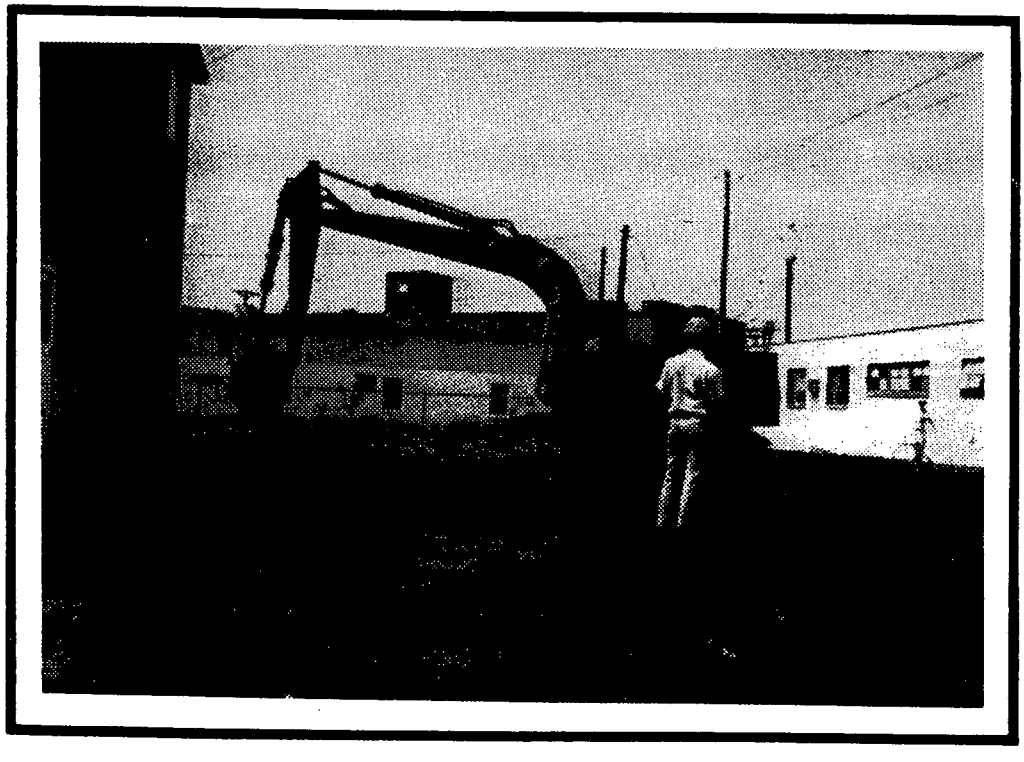


FIGURE 5-7 PARCEL 1 BEING EXCAVATED USING A C-235 BACKHOE

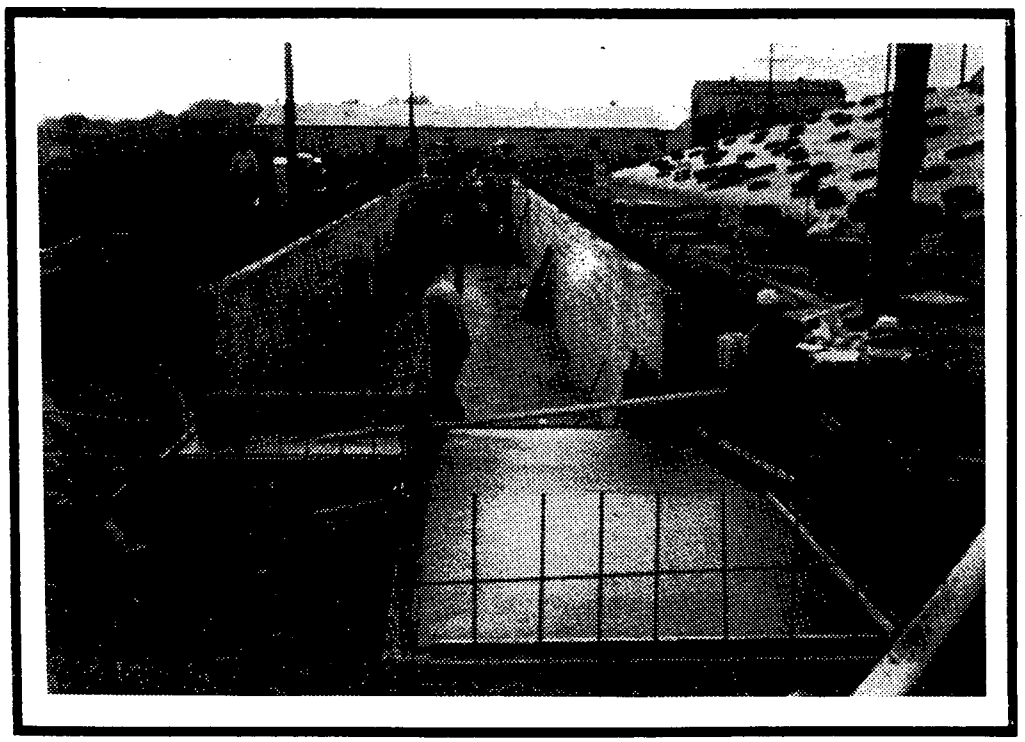


FIGURE 5-8 THE CLARIFIER UNDER CONSTRUCTION (PART OF THE STORAGE PILE CAN BE SEEN ON THE RIGHT)

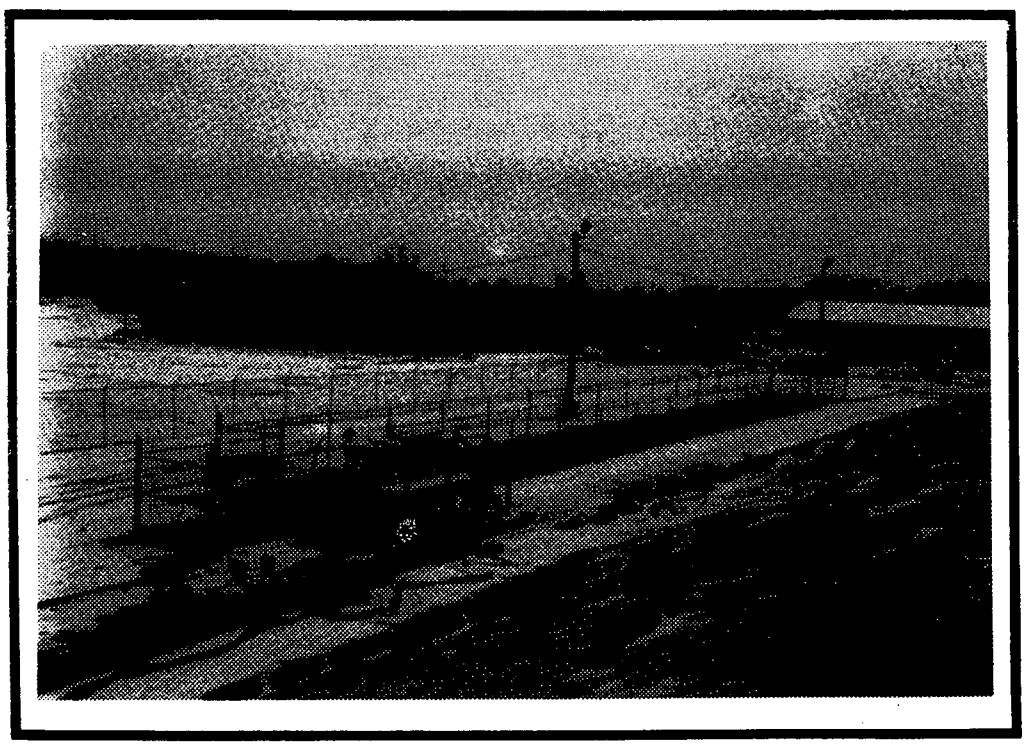


FIGURE 5-9 COMPLETED CLARIFIER AND FLOCCULATORS

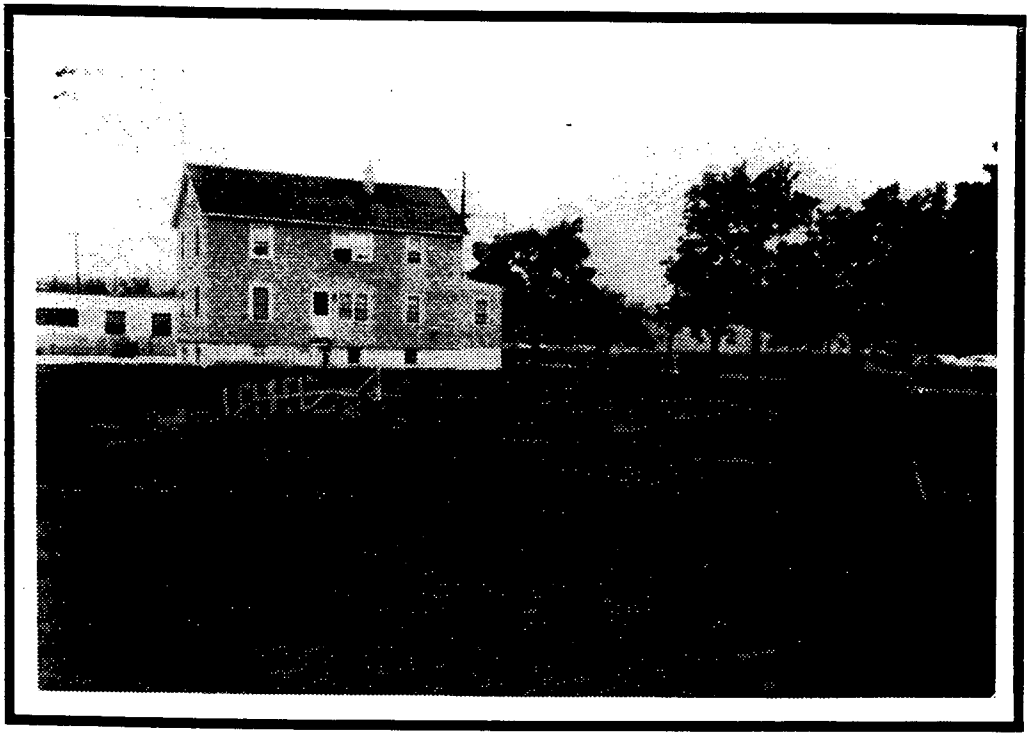


FIGURE 5-10 REAR PORTION OF PARCEL 1 AFTER EXCAVATION

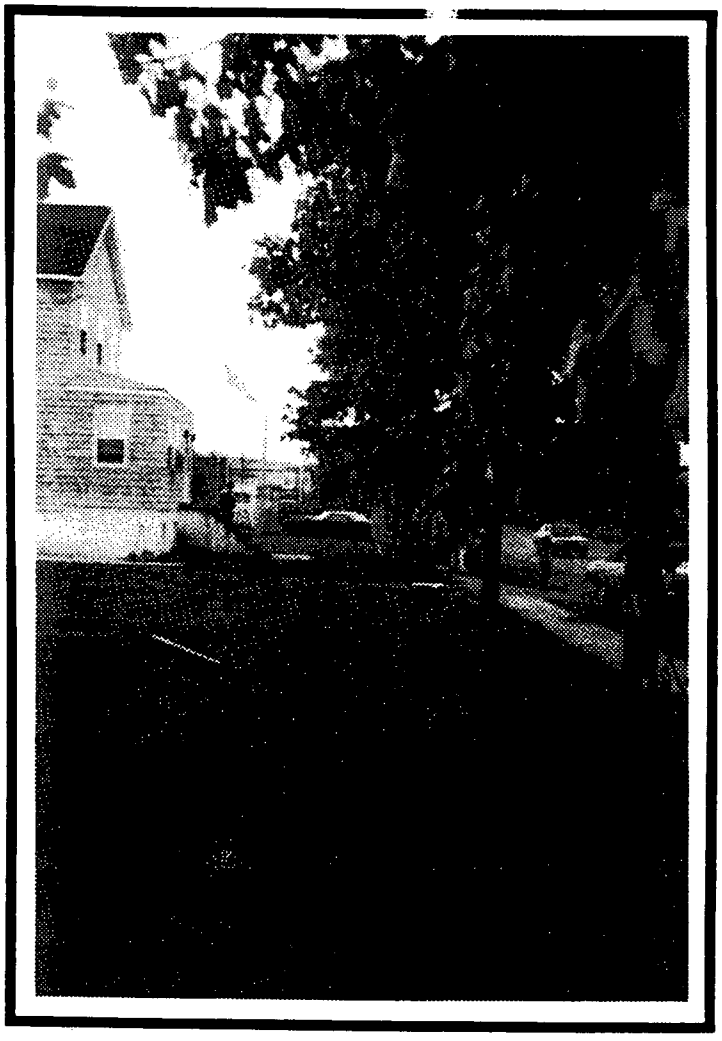


FIGURE 5-11 SODDING OF PARCELS 1 AND 2

- Restoration of the south ditch and excavation of Main Stream began (Figures 5-12, 5-13, 5-14, and 5-15).
- Installation of new plant fencing was completed.
- Landscaping of residential properties was completed (Figures 5-16 and 5-17).

December 1981

- EPDM covering over the storage pile was completed except for joint caulking.
- Backfilling and restoration of Main Stream were completed (Figure 5-18).

January - March 1982

- Incineration of combustible materials was completed (Figures 5-19 and 5-20).

April - May 1982

- Final inspection was held on May 11.

Laboratory analysis results from two post remedial action soil samples taken along the western edge of the excavated area on Parcel 20 indicated elevated concentrations of radium-226. Consequently, two additional areas on this parcel were excavated in the spring of 1984.

5.3 PHOTOGRAPHS

Approximately 650 photographs were taken during Phase II operations. Pre-remedial action conditions were photographed with emphasis on private residences and personal property. A second phase of photographs depicted excavation activity; a third covered the restoration of disturbed property, again with emphasis on private homes. These photographs were used on several occasions in discussions of homeowners' claims. A complete set of photographs is maintained in the BNI Oak Ridge office.

FIGURE 5-12 OVERVIEW OF EXCAVATION IN THE SOUTH DRAINAGE DITCH AREA

FIGURE 5-13 RESTORATION OF THE SOUTH DRAINAGE DITCH AREA IN PROGRESS

FIGURE 5-14 A DOWNSTREAM SECTION OF MAIN STREAM PRIOR TO EXCAVATION

FIGURE 5-15 EXCAVATION OF A DOWNSTREAM SECTION OF MAIN STREAM

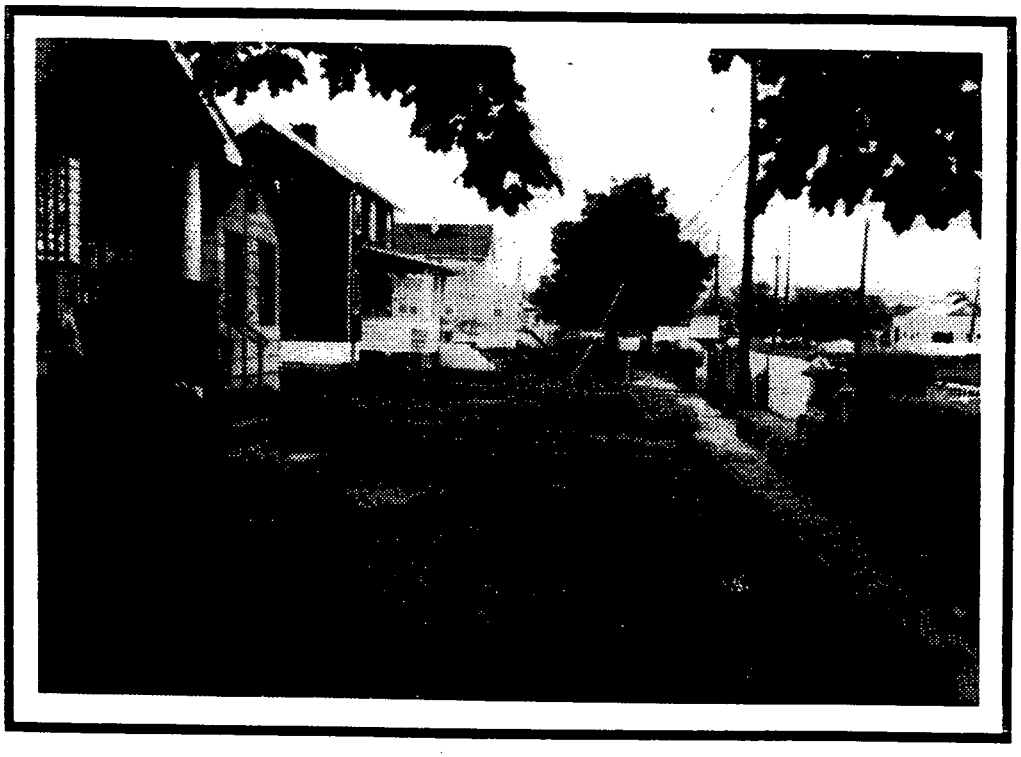


FIGURE 5-16 FRONT YARDS OF PARCELS ALONG MOUNTAIN AVENUE AFTER EXCAVATION

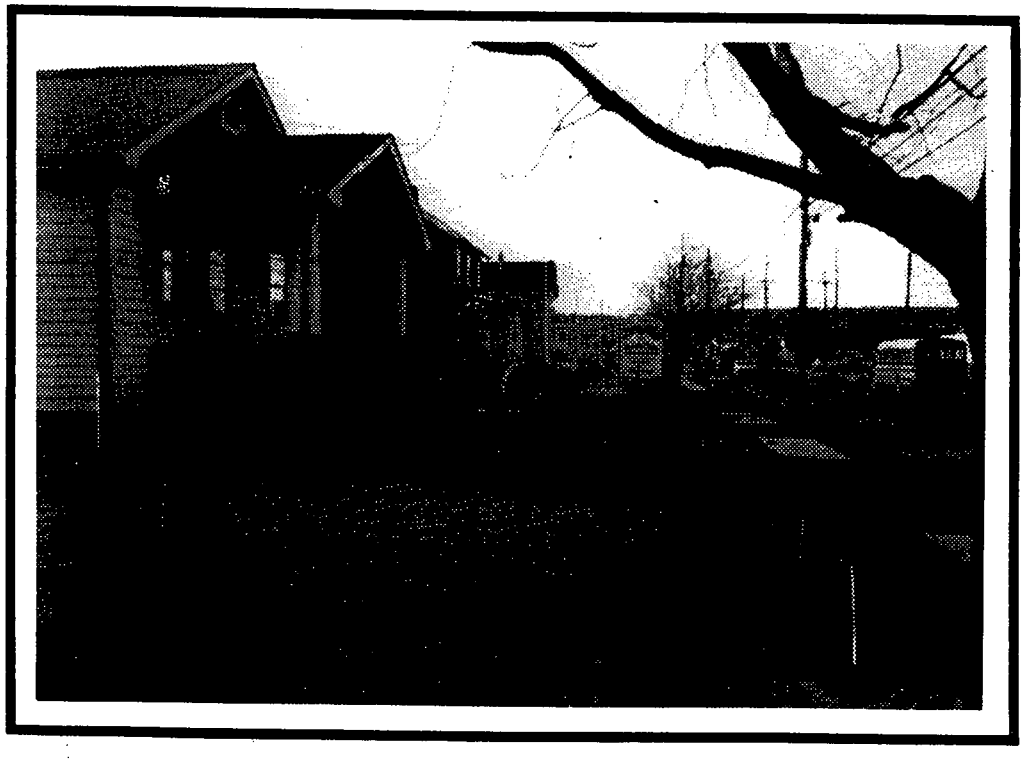


FIGURE 5-17 RELANDSCAPED FRONT YARDS OF PARCELS ALONG MOUNTAIN AVENUE

FIGURE 5-18 D-6 DOZER BACKFILLING THE UPSTREAM SECTION OF MAIN STREAM

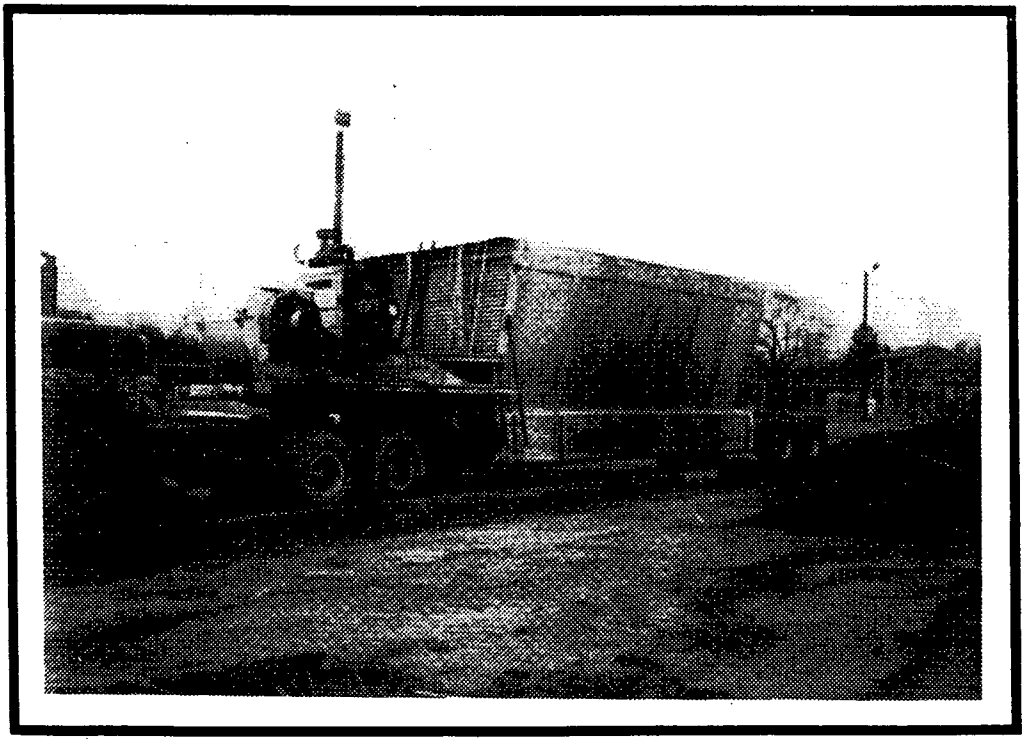


FIGURE 5-19 FRONT AND LEFT SIDE VIEW OF THE ACCU

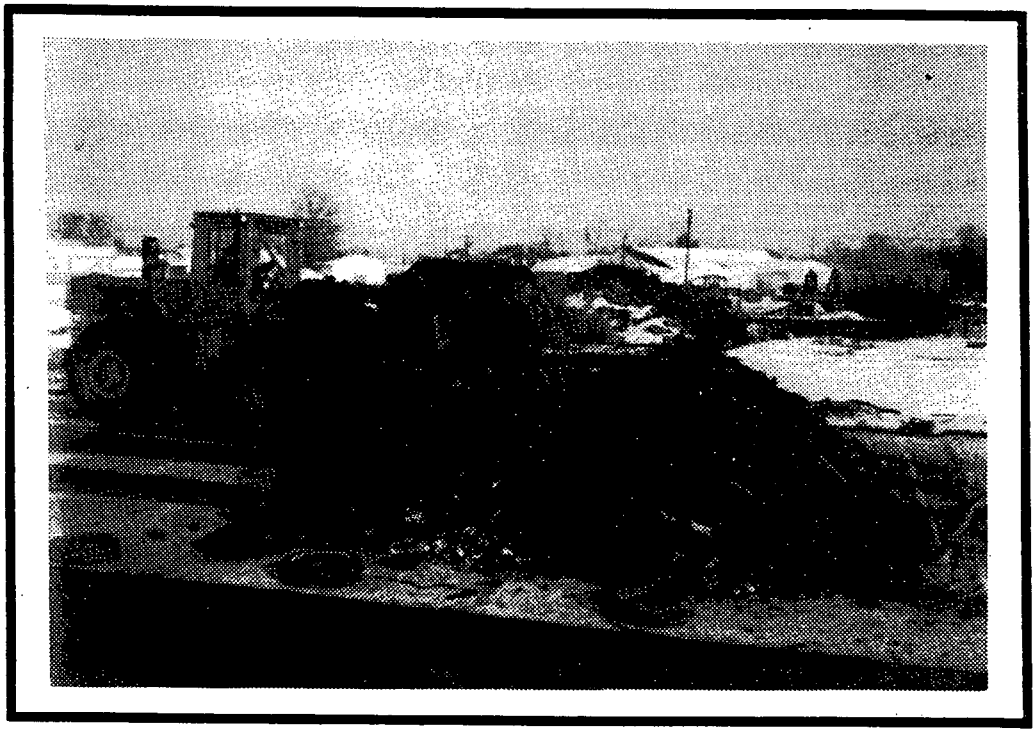


FIGURE 5-20 INCINERATION REMAINS FROM THE ACCU BEING PLACED ON AN EPDM MAT

5.4 AS-BUILT DRAWINGS

As Phase II work was completed, a comprehensive, revised, and updated set of drawings was established depicting final conditions. These drawings encompass all work performed by Reid/Ashland and its subcontractors, including all work performed under change orders issued by NLO and BNI. A complete set of as-built drawings is on file in the BNI Oak Ridge office.

5.5 FINAL INSPECTION AND ACCEPTANCE

Towards the end of Phase II remedial action, BNI field personnel made a final inspection and developed a comprehensive list of items that required attention before completion of the project. All such items and final site cleanup were completed in the spring of 1982. Acceptance of all work was acknowledged by final payment to J. H. Reid/Ashland, and a subcontractor final release was executed on August 27, 1982.

5.6 ENVIRONMENTAL CONTROL

The containment of radioactive material within the work site, the reduction of potentially hazardous conditions during operations, and provision of emergency measures for inclement weather were major concerns during the remedial action. Specific actions taken are described below.

5.6.1 Dust Control

The fine silts and clays in the area were readily airborne once dried and exposed to the atmosphere. Dust proved to be a problem on excavated land, the storage pile, the plant site, and adjacent streets. The problem in the latter two areas was caused by vehicular traffic dropping debris from tires. To minimize this problem, the affected streets were watered daily and swept periodically; the storage pile was compacted daily and covered with

a Visqueen plastic cover. During dry weather excavation, the immediate working area was continuously watered by hoses. Around the residential properties, excavated areas were mulched. Haul trucks were covered with tarpaulins to prevent spillage of radioactive material, as well as to prevent blowing dust.

5.6.2 Erosion Control

Clearing and stripping of the vegetated surfaces surrounding the former MSP increased the runoff potential and presented both radiological and aesthetic problems. Erosion control procedures included the installation of "Erosionet" fabric in diversion ditches, lining the ditches with straw bales to prevent silting, and constructing rock check dams in water courses to act as filters and to create sedimentation basins. Erosion along banks was checked by lining the slopes with filter fabric. Straw mulching and surface contouring was used to reduce erosion on restored land until surface cover could be reestablished. These control methods effectively reduced runoff from stripped land, and post-storm radiological monitoring showed no recontamination of decontaminated areas.

5.6.3 Personnel Monitoring and Control

Access to the work area at the site was controlled at an access trailer where all personnel entering and leaving were checked. When working in contaminated areas, personnel were required to wear work coveralls, gloves, and rubber boots. Each person affiliated with the project also wore a thermoluminescent dosimeter (TLD) badge while on-site. All people leaving the work site were scanned by EIC for possible contamination. Work clothing was not permitted outside the remedial action area. Wash rooms were provided for workers in case decontamination was necessary. A daily log of all entries onto the site was kept by EIC. Approximately 3 minutes were required to check personnel at each entrance or exit from the plant site. A detailed description of personnel monitoring and control is given in Section 6.0, Health Physics Program.

5.6.4 Equipment Monitoring

A stringent program of equipment monitoring covering access and decontamination was enforced throughout the Phase II operations to minimize the possibility of spreading contaminated material. The equipment monitoring procedures employed were consistent with the "as low as reasonably achievable" (ALARA) philosophy, and with the draft American National Standards Institute (ANSI) standard N13.12, "Control of Radioactive Surface Contamination on Materials, Equipment and Facilities to be Released for Uncontrolled Use."

A barrier between the access control trailer and the site maintenance garage was maintained for vehicle access control. All personal vehicles and equipment were discouraged from entering the controlled area. For remote remedial action activity, fences and rope barriers restricted entrance onto the properties involved.

Vehicles that became so coated with mud that contaminated surfaces were shielded from direct monitoring were washed prior to being surveyed. A decontamination pad was located on the extended storage pad to collect washdown water and direct it to the sedimentation tanks.

When leaving a contaminated area, haul trucks were surveyed by a health physics technician. Additional access control points were manned as required (see Figure 5-3 for access points).

The criteria for release for unrestricted use were taken from ANSI N13.12, Table 2, Group 3. Items surveyed were required to be less than 1000 dpm/100 cm^2 removable and 5000 dpm/100 cm^2 total activity. Release criteria used on the site were: a) no detectable removable contamination, and b) 100 cpm per probe area for total activity.

These criteria were implemented by direct surface monitoring for total alpha and beta activity using portable instruments. Further details on equipment monitoring are given in Section 6.0, Health Physics Program.

All earthwork equipment (backhoes, dozers, trucks, and rollers) was washed prior to removal from the work site. Washing generally removed contamination to below detectable levels. In no case was an item that exceeded criteria for contamination released through access control.

5.6.5 Safety

During remedial action the primary NLO/BNI industrial safety effort was the continuous monitoring of subcontractor operations to ensure that safe work practices were followed.

Periodic inspections were conducted by NLO and BNI safety supervisors to assist the field staff in hazard recognition and avoidance and to verify implementation of corrective measures required of the subcontractor.

The most significant potential for serious worker injury was the close proximity of personnel to heavy earthmoving equipment during the remedial action. Personnel awareness of safety concerns was maintained by means of weekly safety meetings.

No recordable medical cases or lost-time accidents were incurred during remedial action activities by NLO, BNI, EIC, or the subcontractors.

6.0 HEALTH PHYSICS PROGRAM

The health physics program for the Phase II remedial action included contamination control, management of occupational exposures, environmental radiological monitoring, and remedial action support.

Spread of contamination to areas outside the bounds of the remedial action site was limited through access control procedures described in Section 5, Phase II Remedial Action, and in the FUSRAP Radiological Protection Program. Data verifying the adequacy of contamination control and personnel monitoring are discussed in Subsection 6.1.

Environmental surveillance of air, water, sediments, and vegetation for radioactive contamination was performed to measure and document the impact of remedial actions on the surrounding environment. The environmental surveillance program is discussed in Subsection 6.2.

Remedial action support included pre-remedial action radiological surveys, radiological surveys during excavation, and post-remedial radiological surveys. The remedial action criteria, sampling grid, types of radiological measurements made, and the equipment used to make the radiological surveys are discussed briefly in Subsection 6.3 and detailed in Volume 2 of this report.

Activities requiring close radiological/engineering management included environmental sample scheduling, contamination control methods for specific tasks, and awareness of potential radiological problems associated with day-to-day activities.

6.1 PERSONNEL PROTECTION AND CONTAMINATION CONTROL PROGRAM

6.1.1 Worker Training Program

An orientation program was presented to all personnel involved with the remedial action prior to their beginning work. Because most subcontractor personnel were inexperienced in radiation-related

work, particular emphasis was placed on the need for personal protection, contamination control, and monitoring procedures.

All training was documented by signed statements from each attendee acknowledging that he understood the information presented and that his questions were satisfactorily answered. These statements and a list of references and training aids used in the orientation are on file in the BNI Oak Ridge office.

6.1.2 Access and Transport Control

Access to the storage pad area was controlled through an access trailer on the north side of the site near the process building. All traffic was controlled and monitored at this location. All personnel entering the controlled area were issued rubber shoe covers. Personnel directly involved with excavation and construction were issued coveralls. All soiled coveralls and other clothing were laundered at the access trailer. Wastewater from showers and the laundering facility drained to an on-site septic tank for interim storage. Prior to pumping the septic tank water to the public sanitary sewer system, samples were collected and analyzed for radium-226. In all cases, the concentration of soluble radium-226 was below the discharge limit of 30 pCi/l established in DOE Order 5480.1A.

Upon leaving an area, all personnel were monitored for detectable contamination, was defined as twice the nominal background level. An action level of 200 cpm on an Eberline Model RM-14 radiation monitor with attached Eberline Model HP-210 thin window Geiger-Mueller probe was established. Vehicles exiting were similarly monitored. A decontamination washdown pad was provided for vehicles found to be contaminated. Wastewater drained to the on-site drainage control system. Controlled vehicle/material logs were maintained throughout Phase II operations and are on file at the BNI project office.

6.1.3 Personnel Monitoring

Radiological monitoring services for personnel involved in Phase II work were provided to ensure that protection standards were not exceeded. Monitoring was conducted by means of bioassay and dosimetry.

Bioassay

Urine samples were collected from all on-site personnel prior to beginning work and prior to their termination from the job. All samples were shipped to the EIC Albuquerque laboratory for total uranium and radium-226 analyses.

Based on operating experience at DOE facilities, the action level for uranium in urine was set at 30 µg/l or 13 pCi/l. Pursuant to FUSRAP philosophy of limiting personal radiation exposure to ALARA, a 15 µg/l action level was established.

Personnel bioassay data collected during Phase II are presented in Table 6-1. A total of 10 persons had closeout bioassay results in excess of the Phase II action level of 15 µg/l total uranium. Of those 10 persons, three had closeout bioassay results in excess of the DOE action level of 30 µg/l. The maximum bioassay result was 45 µg/l total uranium. These results were compared with action levels presented in the U.S. Nuclear Regulatory Commission Regulatory Guide (RG) 8.11 "Applications of Bioassay for Uranium." Comparison of the uranium concentrations and sampling frequencies with the data presented in Figure 12 of RG 8.11 showed all dose commitments to be equal to or less than one fifth of the maximum permissible 50-yr dose commitment or less than 60 mrem per year. Per Table 4 of RG 8.11, the bioassay results indicate that contamination containment and personnel air sampling capabilities of the personnel protection program were adequate.

Two closeout bioassay results for radium-226 indicated positive results. One was only slightly greater than the 0.2 pCi/l action level and the second was 0.56 pCi/l. Based on International

TABLE 6-1

MIDDLESEX PHASE II

PERSONNEL BIOASSAY RESULTS

Uranium	Individuals
Less than 15 ug/l	79
15 ug/liter to 30 ug/l	7
Greater than 30 ug/l	3
Radium-226	
Less than 0.2 pCi/l	87
0.2 pCi/l to 0.5 pCi/l	1
0.5 pCi/l to 1.0 pCi/l	1
Greater than 1 pCi/l	0

Commission on Radiological Protection Publication 10 (ICRP-10) models, the predicted 50-yr dose commitment to bone based on 0.56 pCi/l in a sample would be 1.9 rem or approximately 40 mrem/yr.

All bioassay records are on file at the BNI Oak Ridge office.

Dosimetry

All full-time project personnel were issued TLD badges, which were exchanged on a quarterly basis. Results showed that no personnel were exposed to gamma radiation levels above nominal natural background. A summary of personnel TLD results for Phase II activities is presented in Table 6-2. All TLD exposure records are on file at the BNI project office.

6.2 ENVIRONMENTAL SURVEILLANCE

An integral part of the radiation protection program instituted for Phase II was the surveillance of air quality and of contamination in surface water, groundwater, and stream sediments, both on-site and in the vicinity of the former MSP. Sample collection locations were selected to provide coverage of potential pathways for contamination, particularly during removal of contaminated soil. These sample points are shown in Figure 6-1.

Environmental radioactivity in the areas cleaned during Phase II was near background concentrations. As a result, careful sample collection and analytical techniques with internal quality controls were required in order to assess the effects associated with the Phase II remedial activities. Review of pertinent environmental radiological data indicates that environmental radiological conditions at Middlesex were not adversely affected during the cleanup. The monitoring techniques used are discussed in the following sections.

TABLE 6-2

MIDDLESEX PHASE II

PERSONNEL TLD MONITORING SUMMARY

Badges	Exposure Range (rem)
123	Less Than 0.010
4	0.010 to 0.099
0	Greater than 0.100

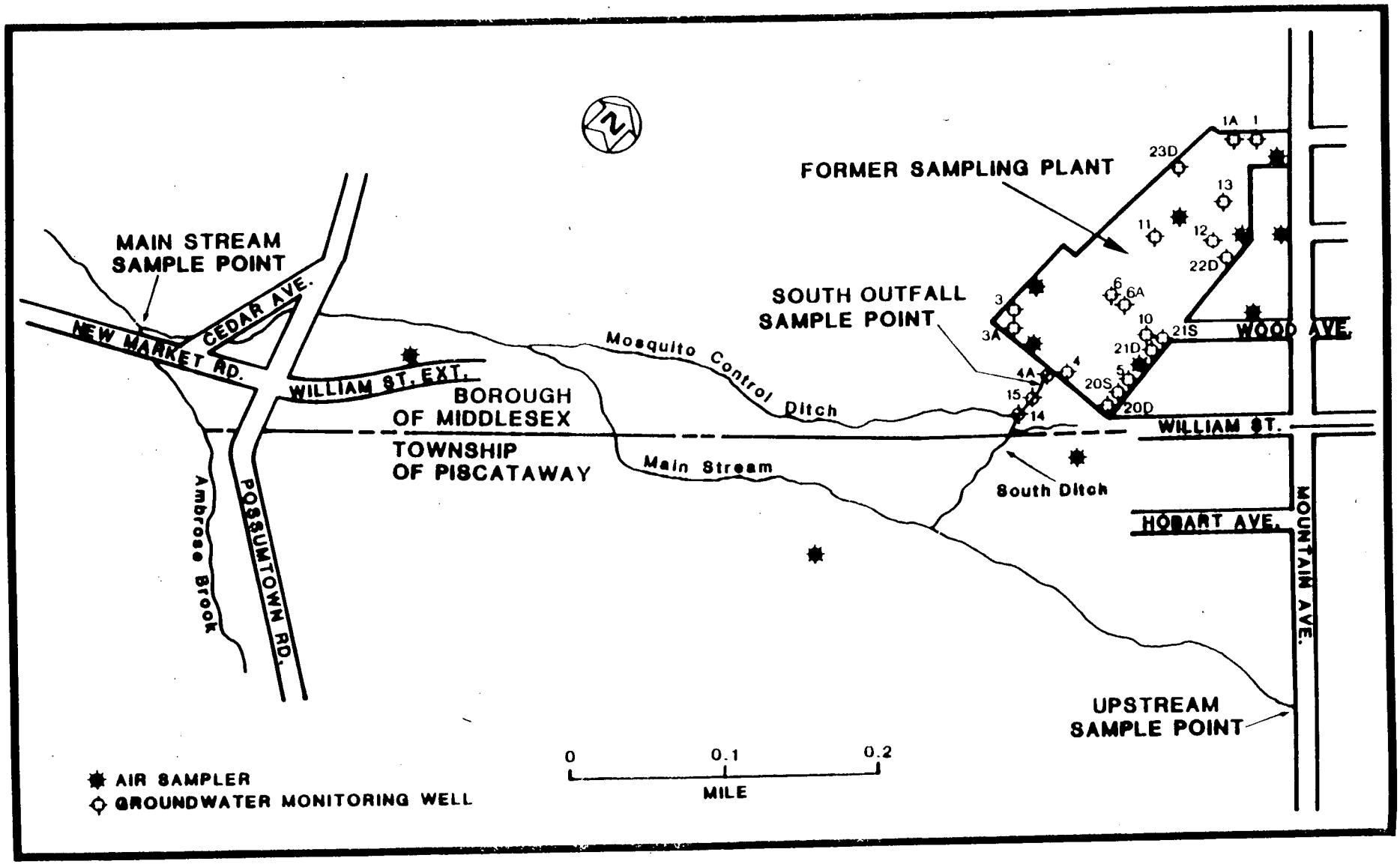


FIGURE 6-1 MIDDLESEX PHASE II ENVIRONMENTAL MONITORING LOCATIONS

6.2.1 Air

Gross Alpha Concentrations in Air

Continuous running air sampling pumps were positioned on, or as near as possible to, the four cardinal compass points on the perimeter of most areas scheduled for remedial action. Exceptions were made in areas where soil contamination levels were known to be minimal (i.e. slightly above criteria) and where cleanup areas were immediately adjacent to continuous air monitoring locations near the plant site. These included the area between Wood Avenue and William Street (non-residential Parcels 10, 11, 12, 14, and 15) and Parcel 24.

Extensive work areas such as the flood plain south and west of the former MSP were monitored by samplers positioned on the extreme boundaries of excavation, thus eliminating the need for constant relocation as work progressed. Results from these samples are summarized in Figures 6-2 through 6-4 and indicate that no potentially hazardous airborne contamination levels were created.

Average gross alpha air concentrations monitored at the former MSP from July 13 to November 11, 1981 ranged from less than the lower limit of detectability (0.002 pCi/m^3) to 0.011 pCi/m^3. To compare the gross alpha air concentrations with the applicable guidelines in DOE Order 5480.1A, the maximum average concentration, 0.011 pCi/m^3 gross alpha, was compared with the guideline for the most limiting radionuclide of the uranium decay series, thorium-230. The release limit for thorium-230 to uncontrolled areas is 0.08 pCi/m^3. The maximum average concentration was less than 15 percent of the maximum permissible concentration of thorium-230.

Average gross alpha air concentrations monitored on Parcels 1 through 7 ranged from less than 0.002 pCi/m^3 to 0.005 pCi/m^3. Continuous monitoring was conducted from June 15 to September 28, 1981. Similarly, average gross alpha air concentrations in several

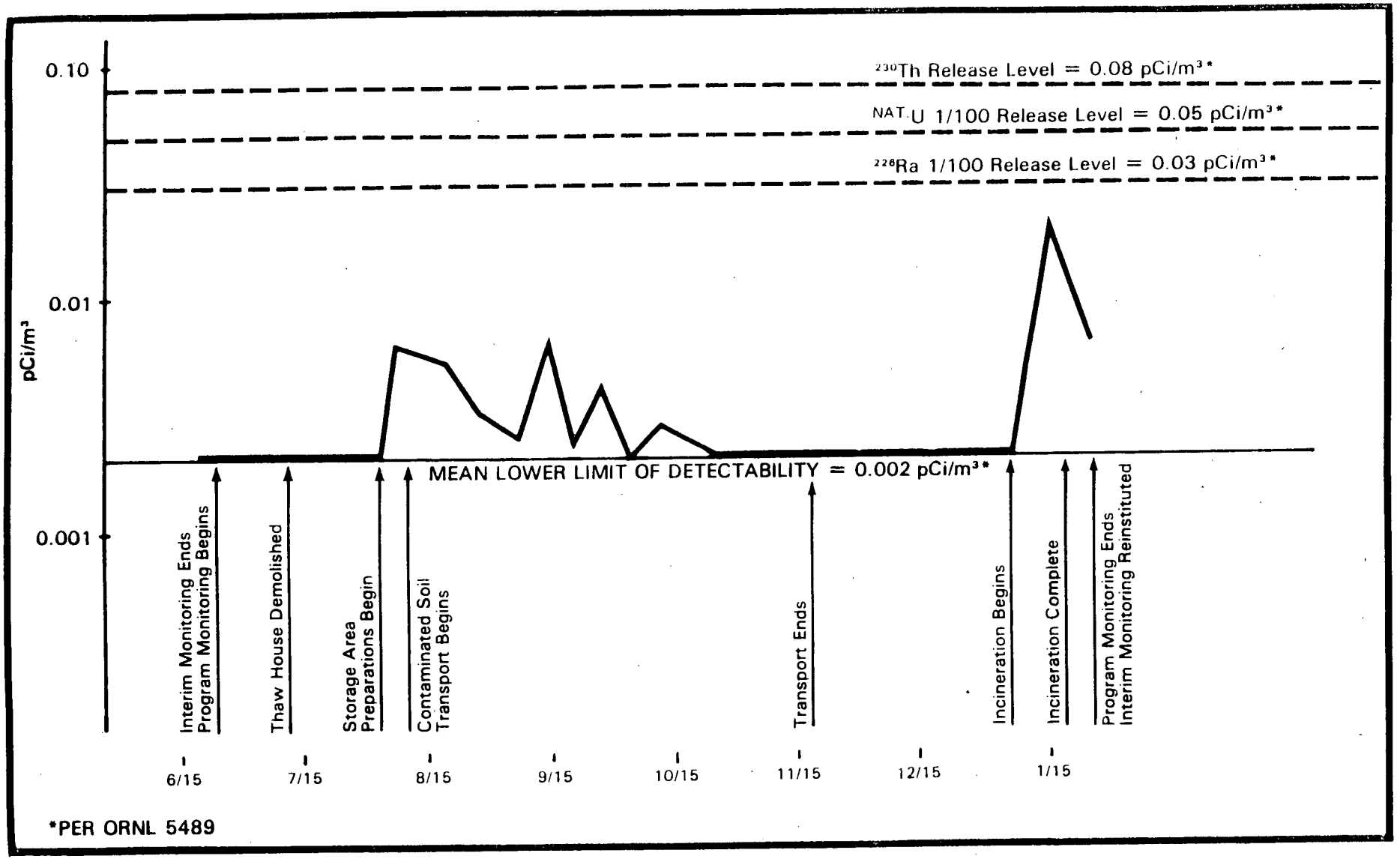


FIGURE 6-2 AVERAGE GROSS ALPHA AIR CONCENTRATIONS AT THE FORMER MSP

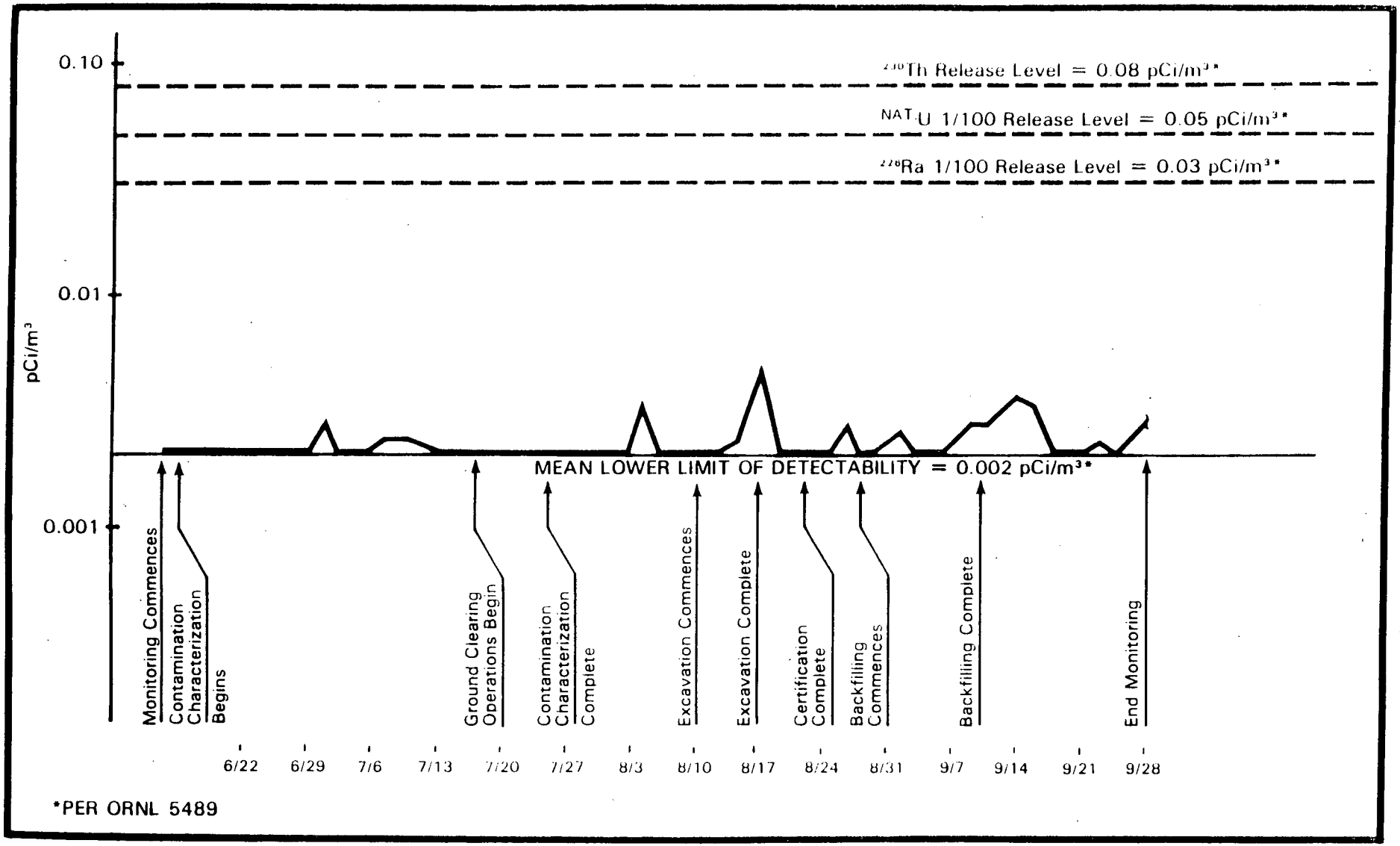


FIGURE 6-3 AVERAGE GROSS ALPHA AIR CONCENTRATIONS AT PARCELS 1-6

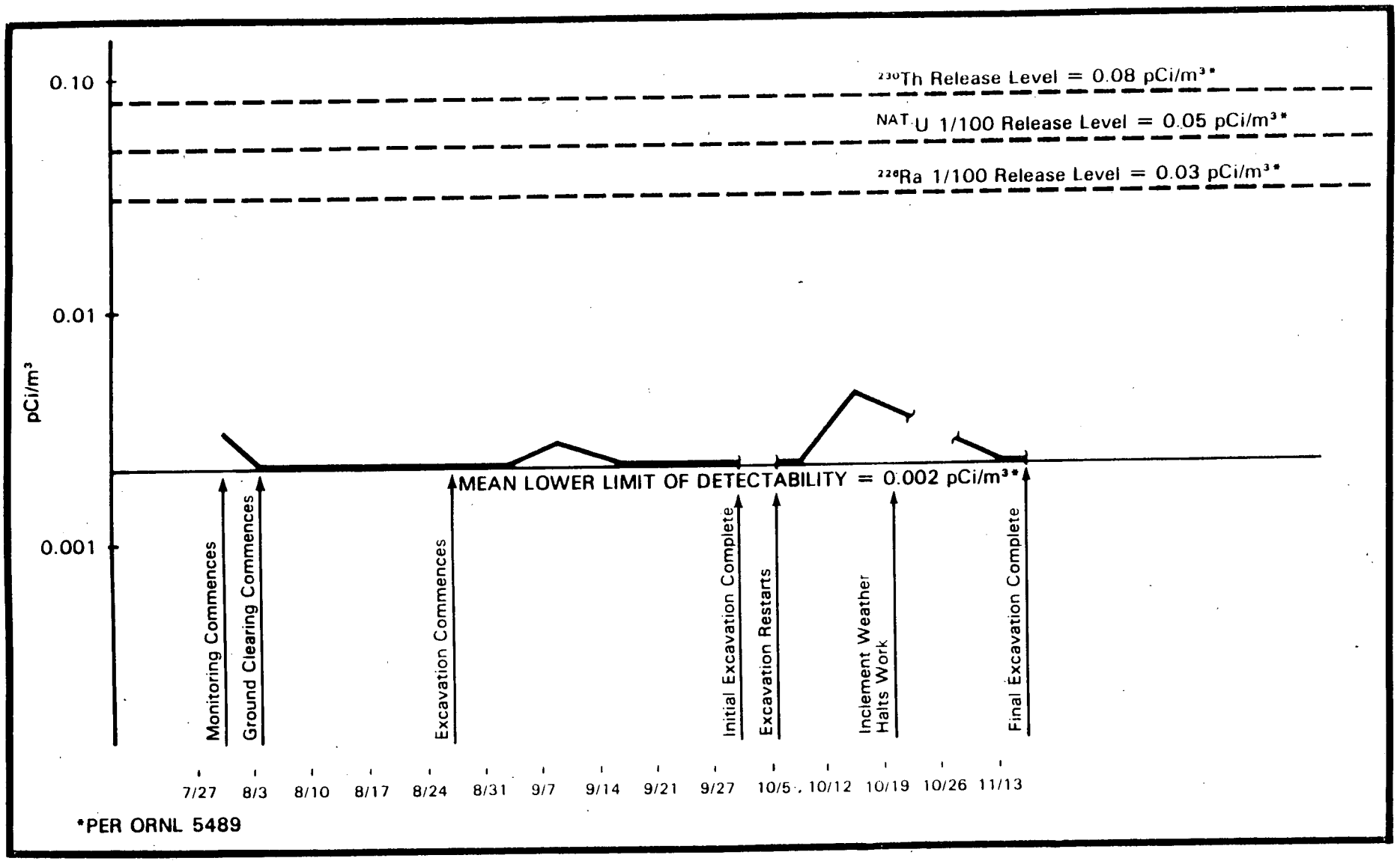


FIGURE 6-4 AVERAGE GROSS ALPHA AIR CONCENTRATIONS AT THE SOUTH DRAINAGE AREA

areas of the flood plain, Parcels 8 through 33, ranged from less than 0.002 pCi/m^3 to 0.007 pCi/m^3 between July 27 and November 4, 1981. Averaged gross alpha airborne concentrations are presented in Figures 6-2 through 6-4. To compare the gross alpha air concentrations with the applicable guideline, the maximum average concentration, 0.007 pCi/m^3 gross alpha, was again compared with the guideline for thorium-230. The release limit for thorium-230 to uncontrolled areas is 0.08 pCi/m^3. The maximum average concentration was less than 10 percent of the maximum permissible concentration of thorium-230.

Airborne Particulate Concentrations

Monthly composites, by location, of all on-site air filters that were counted for gross alpha were sent to the EIC Albuquerque laboratory for radium-226, thorium-230, lead-210, and uranium analyses. Results are presented in Table 6-3. The radionuclide concentrations of the worst case -- south drainage area, October -- were compared with the guidelines specified in DOE Order 5480.1A for uncontrolled areas. The sum of the ratios of the concentrations present to applicable guidelines for each radionuclide was 0.15, indicating that the sum of airborne concentrations was 15 percent of guideline values.

Personal lapel (breathing zone) air samplers were provided to backhoe operators as needed. No concentrations above detectable limits, 1×10^{-12} $\mu Ci/cc$, were measured.

Radon-222 Concentrations

Time-integrated radon-222 sampling was conducted by project personnel, as needed, in conjunction with air particulate sampling. Continuous radon-222 monitoring has been conducted by the Monsanto Corporation at several locations around the site since 1980. Sampling results from this program during Phase I indicated that the radon-222 concentrations in excavation areas were less than 3.0 pCi/l, the non-occupational maximum permissible concentration specified in DOE Order 5480.1A. This limit was not exceeded throughout Phase II remedial activities, as shown in Figure 6-5.

TABLE 6-3

MEAN CONCENTRATION OF AIRBORNE

PARTICULATES IN SAMPLE COMPOSITES

FROM MIDDLESEX PHASE II AIR MONITORS

(10^{-3} pCi/m^3)

FORMER MIDDLESEX SAMPLING PLANT

	June	July	August	September	October
Total Uranium	0.1	0.1	0.1	0.1	0.07
Thorium-230	0.3	0.2	0.1	0.2	0.1
Radium-226	0.3 ± 0.1	0.3 ± 0.2	0.4 ± 0.2	1.0 ± 0.3	0.3 ± 0.1
Lead-210	10.9 ± 2.0	10.0 ± 1.3	13.2 ± 1.8	13.0 ± 2.0	12.7 ± 2.3

PARCELS 1-6

	June	July	August	September
Total Uranium	0.2	0.1	0.07	0.1
Thorium-230	0.4	0.2	0.2	0.2
Radium-226	0.3 ± 0.2	0.5 ± 0.2	0.6 ± 0.1	0.7 ± 0.3
Lead-210	12.5 ± 2.8	10.8 ± 1.0	15.0 ± 2.0	10.4 ± 2.5

SOUTH DRAINAGE AREA

	September	October
Total Uranium	0.4	3.6
Thorium-230	0.8	7.7
Radium-226	1.3 ± 0.7	58.6
Lead-210	18.7 ± 7.3	132.5

All concentrations are reported at a 95% confidence level.

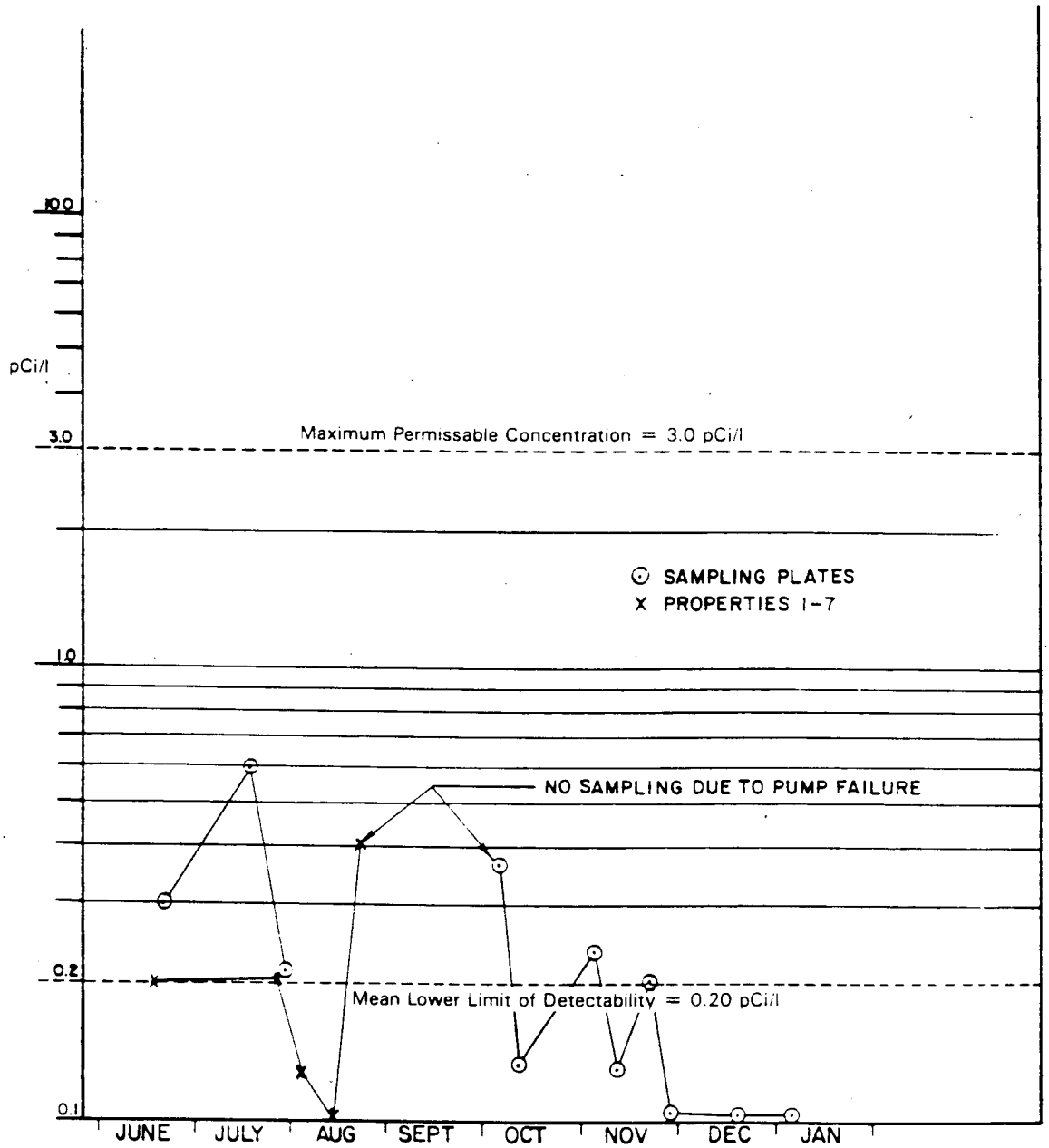


FIGURE 6-5 AVERAGE RADON CONCENTRATIONS AT THE FORMER MSP AND VICINITY PROPERTIES

6.2.2 Water

Surface Water

Sample locations chosen for Phase I were used again in Phase II. After reviewing Phase I analytical results, it was determined that these locations would be sampled weekly. The sampling frequency was increased as warranted by site activities.

The sampling locations included the drainage area on the southern perimeter of the former Sampling Plant, designated "South Outfall", downstream at Cedar Avenue, designated "Main Stream" and the below grade settling sump (later settling basin). A control sampling site was established on the Main Stream at Mountain Avenue, designated "Upstream". These sampling locations provided easy identification of the source of any contamination within the drainage system. Phase II water samples were sent to a central laboratory for analyses. Results of these analyses are presented in Tables 6-4 through 6-7 and summarized in Table 6-8. The greatest average discharge concentrations, measured at the South Outfall were less than 10 percent of the concentration guide, DOE Order 5480.1A, for both radium-226 and uranium.

Groundwater

Groundwater monitoring wells drilled at various locations on-site and south of the former MSP during Phase I were augmented by eight additional wells drilled on-site during Phase II. Depths of the eight new wells were either 10 ft or 50 ft. All well locations are shown on Figure 6-1.

TABLE 6-4

DETERMINATION OF RADIUM-226 AND URANIUM

IN SURFACE WATER SAMPLES

(SOUTH OUTFALL)[a]

Sample Number	Date Collected	Total Volume (ml)	Total Uranium (µg/l)	Radium-226 Dissolved (pCi/l)	Radium-226 Total (pCi/l)
W2000	7/16/81	990	290	N.A.[b]	6.8 ± 2.0
W2015	7/23/81	4060	300	N.A.	11.0 ± 3.0
W2029	7/28/81	1020	130	N.A.	2.7 ± 0.8
W2036	7/30/81	1020	150	N.A.	2.5 ± 0.7
W2038	8/04/81	1050	155	1.8 ± 0.5	7.4 ± 2.2
W2042	8/05/81	1000	47	1.0 ± 0.3	3.2 ± 1.0
W2045	8/06/81	1000	96	N.A.	4.0 ± 1.2
W2051	8/11/81	1040	78	N.A.	2.2 ± 0.7
W2057	8/12/81	1084	50	0.1	1.6 ± 0.5
W2068	8/18/81	1030	256	1.6 ± 0.5	3.7 ± 1.1
W2078	8/20/81	6043	5	3.3 ± 1.0	4.6 ± 1.4
W2089	8/27/81	1360	N.A.	12.0 ± 4.0	18.2 ± 5.9
W2095	9/01/81	1000	77	1.0 ± 0.3	N.A.
W2098	9/03/81	1810	N.A.	2.1 ± 0.6	2.9 ± 0.9
W2103	9/09/81	1040	11	0.7 ± 0.2	1.0 ± 0.3
W2110	9/10/81	1030	N.A.	N.A.	3.7 ± 1.1
W2128	9/17/81	4100	27	N.A.	3.7 ± 1.1
W2132	9/22/81	1000	54	N.A.	0.2
W2136	9/24/81	1000	N.A.	N.A.	0.2 ± 0.1
W2139	9/29/81	1000	N.A.	N.A.	5.3 ± 1.6
W2143	10/01/81	1000	210	N.A.	3.0 ± 0.9
W2145	10/06/81	1100	N.A.	N.A.	4.0 ± 1.2
W2149	10/12/81	820	86	N.A.	4.7 ± 1.4
W2150	10/13/81	1000	N.A.	N.A.	2.2 ± 0.7
W2156	10/20/81	1000	N.A.	N.A.	10.0 ± 3.0
W2161	10/21/81	1000	N.A.	N.A.	6.7 ± 2.0
W2162	10/28/81	1000	5	N.A.	1.5 ± 0.5
W2167	11/03/81	1000	210	N.A.	14.0 ± 4.0
W2185	11/03/81	1000	N.A.	N.A.	4.7 ± 1.4
W2186	11/05/81	1100	N.A.	N.A.	2.7 ± 0.8
W2190	11/10/81	1170	N.A.	N.A.	810.0 ± 240.0[c]
W2195	11/12/81	1100	N.A.	N.A.	3.0 ± 0.9
W2197	11/17/81	1090	N.A.	N.A.	2.8 ± 0.8
W2201	11/19/81	1080	N.A.	N.A.	8.7 ± 2.6
W2206	11/24/81	4020	780	N.A.	11.0 ± 3.0

[a] Results are reported at a 95% confidence level.

[b] N.A. Not analyzed

[c] Sample had a high suspended solids content due to remedial actions in progress at the time in the South Drainage Ditch area.

TABLE 6-5

DETERMINATION OF RADIUM-226 AND URANIUM IN SURFACE WATER SAMPLES (MAIN STREAM)

Sample Number	Date Collected	Total Volume (ml)	Total Uranium (µg/l)	Radium-226 Dissolved (pCi/l)	Radium-226 Total (pCi/l)
W2002	7/16/81	1000	22	N.A.	0.6 ± 0.2
W2023	7/23/81	3784	14	N.A.	0.2 ± 0.1
W2035	7/30/81	1000	18	N.A.	0.5 ± 0.2
W2040	8/05/81	1070	<10	N.A.	2.0 ± 0.6
W2044	8/06/81	1100	10	N.A.	0.4 ± 0.1
W2054	8/12/81	1067	<10	<0.1	<0.2
W2076	8/20/81	5806	<10	0.5 ± 0.1	1.3 ± 0.5
W2091	8/27/81	1602	<5	0.5 ± 0.1	0.6 ± 0.2
W2093	8/31/81	1000	<10	0.1 ± 0.1	<0.1
W2097	9/03/81	3200	<10	<0.1	<0.5
W2107	9/10/81	1030	<20	1.2 ± 0.4	3.3 ± 1.0
W2126	9/17/81	1020	N.A.	N.A.	1.3 ± 0.4
W2133	9/24/81	1000	N.A.	N.A.	1.0 ± 0.3
W2142	10/01/81	4000	12	N.A.	0.9 ± 0.3
W2147	10/08/81	1000	N.A.	N.A.	1.3 ± 0.4
W2154	10/15/81	4000	10	N.A.	2.1 ± 0.6
W2158	10/21/81	1000	N.A.	N.A.	0.5 ± 0.2
W2170	10/29/81	4000	17	N.A.	0.8 ± 0.2
W2187	11/05/81	1000	23	N.A.	0.5 ± 0.1
W2191	11/12/81	1080	N.A.	N.A.	0.3 ± 0.1
W2198	11/19/81	1020	N.A.	N.A.	0.3 ± 0.1
W2203	11/24/81	4100	70	N.A.	0.8 ± 0.2

Results are reported at a 95% confidence level.

N.A. Not analyzed

TABLE 6-6

DETERMINATION OF RADIUM-226 AND URANIUM

IN SURFACE WATER SAMPLES

(UPSTREAM)

Sample Number	Date Collected	Total Volume (ml)	Total Uranium (µg/l)	Radium-226	
				Dissolved (pCi/l)	Total (pCi/l)
W2003	7/16/81	900	<5	N.A.	0.1 ± 0.1
W2019	7/23/81	4030	<5	N.A.	0.1 ± 0.1
W2034	7/30/81	1020	<5	N.A.	0.1 ± 0.1
W2043	8/06/81	1050	<5	N.A.	0.1 ± 0.1
W2055	8/13/81	1000	<10	0.24 ± 0.07	<0.3
W2077	8/20/81	4000	<10	0.50 ± 0.20	1.2 ± 0.6
W2090	8/27/81	1000	N.A.	0.32 ± 0.10	<0.5
W2099	9/03/81	3470	<10	0.69 ± 0.21	<1.1
W2108	9/10/81	1030	<10	0.10 ± 0.05	0.2 ± 0.1
W2127	9/17/81	1020	N.A.	N.A.	0.1 ± 0.1
W2134	9/24/81	1000	N.A.	N.A.	0.1 ± 0.1
W2142	10/01/81	4000	12	N.A.	0.9 ± 0.3
W2146	10/08/81	1020	N.A.	N.A.	0.4 ± 0.1
W2153	10/15/81	4000	<5	N.A.	1.3 ± 0.4
W2159	10/21/81	1000	N.A.	N.A.	0.1 ± 0.1
W2169	10/29/81	4000	<5	N.A.	2.3 ± 0.5
W2188	11/05/81	1000	<5	N.A.	0.3 ± 0.1
W2193	11/12/81	1060	N.A.	N.A.	0.3 ± 0.1
W2199	11/19/81	930	N.A.	N.A.	0.5 ± 0.2
W2204	11/24/81	4100	<5	N.A.	0.1 ± 0.1

Results are reported at a 95% confidence level.

N.A. Not analyzed

TABLE 6-7

DETERMINATION OF RADIUM-226 AND URANIUM

IN SURFACE WATER SAMPLES

(BELOW GRADE SETTLING SUMP)

(New Settling Basin after 11/05/81)

Sample Number	Date Collected	Total Volume (ml)	Total Uranium (µg/l)	Radium-226 Dissolved (pCi/l)	Radium-226 Total (pCi/l)
W2001	7/16/81	990	<5	N.A.	0.6 ± 0.2
W2011	7/23/81	4030	8	N.A.	0.6 ± 0.2
W2037	7/30/81	1020	40	N.A.	1.5 ± 0.4
W2046	8/06/81	1060	38	1.2 ± 0.4	6.8 ± 2.1
W2056	8/13/81	1000	47	0.3 ± 0.1	2.8 ± 0.9
W2079	8/20/81	4000	<10	2.3 ± 0.7	4.1 ± 1.2
W2092	8/27/81	1000	N.A.	2.9 ± 0.9	3.4 ± 1.0
W2100	9/03/81	3480	<10	1.1 ± 0.3	24.1 ± 7.3
W2109	9/10/81	1030	170	0.7 ± 0.2	3.9 ± 1.2
W2129	9/17/81	1010	N.A.	N.A.	3.0 ± 0.9
W2135	9/24/81	1000	N.A.	N.A.	0.1 ± 0.1
W2144	10/01/81	4000	37	N.A.	0.7 ± 0.2
W2160	10/21/81	1000	N.A.	N.A.	4.9 ± 1.5
W2168	10/29/81	4000	44	N.A.	5.2 ± 1.6
W2189	11/05/81	1000	29	N.A.	9.5 ± 2.9
W2194	11/12/81	1000	N.A.	N.A.	4.9 ± 1.5
W2200	11/19/81	1020	N.A.	N.A.	5.2 ± 1.6
W2205	11/24/81	4030	400	N.A.	6.8 ± 2.0

Results are reported at a 95% confidence level.

N.A. Not analyzed

TABLE 6-8

SUMMARY OF TOTAL URANIUM AND DISSOLVED RADIUM-226 IN SURFACE WATER

Table	Sampling Location	Total Uranium Concentration (mg/l) Minimum	Maximum	Average	Percent of Standard (Avg.)	Dissolved Radium-226 Concentration (pCi/l) Minimum	Maximum	Average	Percent of Standard (Avg.)
6-4	South Outfall	0.005	0.780	0.15	8	0.1	12.0 ± 4.0	2.6	9
6-5	Main Stream	0.005	0.070	0.01	1	0.1	1.2 ± 0.4	0.4	1
6-6	Upstream	0.005	0.012	0.007	1	0.010 ± 0.05	0.69 ± 0.21	0.4	1
6-7	Settling Basin	0.005	0.400	0.07	1	0.3 ± 0.1	2.9 ± 0.9	1.4	5

DOE Order 5480.1A, Chapter XI guide for uranium in water released to uncontrolled areas is 2 mg/l.

DOE Order 5480.1A, Chapter XI guide for radium-226 in water released to uncontrolled areas is 30 pCi/l.

Wells were sampled monthly during Phase II to monitor for any potential groundwater contamination resulting from construction at the former MSP. Analytical results of groundwater samples are presented in Table 6-9 and summarized in Table 6-10. Primary drinking water standards, 40 CFR 141, for uranium and radium are 30 µg/l and 5 pCi/l, respectively. The data indicate that no contamination of groundwater occurred as a result of construction activities. The DOE Order 5480.1A guidelines for uranium and radium in groundwater are 2000 µg/l and 30 pCi/l, respectively. Analytical results of potable water samples from private residences are presented in Table 6-11. All of the potable water samples from private residences had total uranium concentrations of less than or equal to 5 µg/l and total radium-226 concentrations of less than or equal to 0.1 pCi/l.

6.2.3 Stream Sediments

Stream sediment samples were collected at monthly intervals at the Main Stream and South Outfall water sampling locations and submitted to a central laboratory for analysis. Results of analyses for radium-226 and total uranium are presented in Table 6-12; a summary is presented in Table 6-13.

6.2.4 Vegetation

Major portions of the areas scheduled for remedial action were densely wooded. Thus, it was necessary to initiate a radium-226 monitoring program for the wood removed during clearing operations. In order to keep the interim storage pile volume to a minimum and to save potentially usable lumber from incineration, a derived criterion for the release of uncontaminated wood as logs or chips was established.

Representative wood chips were collected in the Middlesex vicinity. These samples were far enough removed from the former MSP to provide typical background radium-226 for analysis. Results revealed a mean

TABLE 6-9

DETERMINATION OF RADIUM-226 AND URANIUM IN GROUNDWATER SAMPLES[a]

(FORMER SAMPLING PLANT DOE WELLS)

Well Number	Date Collected	Uranium (µg/l)		Radium-226 (pCi/l)	
		Total [Suspended]	Dissolved	Total [Suspended]	Dissolved
	8/18/81	[<5]	<5	[0.2 ± 0.1]	0.1 ± 0.1
1	9/16/81	N.A.	<5	[1.0 ± 0.3]	<0.1
	11/02/81	9	N.A.[b]	0.6 ± 0.2	N.A.
	8/18/81	[<5]	27	[<0.2]	1.1 ± 0.3
3	9/16/81	[<5]	16	[6.0 ± 1.8]	1.2 ± 0.4
	11/02/81	17	N.A.	1.7 ± 0.5	N.A.
	8/18/81	<5	N.A.	0.1 ± 0.1	N.A.
3A	9/16/81	[51]	24	[120.0 ± 40.0]	1.8 ± 0.5
	11/02/81	15	N.A.	0.2 ± 0.1	N.A.
4	7/29/81	[6]	<5	[2.0 ± 0.6]	3.1 ± 0.9
	8/18/81	[<5]	<5	[0.1]	0.6 ± 0.2
4A	9/16/81	[<5]	<5	[67.0 ± 20.0]	0.2 ± 0.1
	11/02/81	43	<5	19.0 ± 6.0	N.A.
5	7/15/81	[8]	25	[2.3 ± 0.7]	5.4 ± 1.6
6[c]	7/15/81	[990]	15,000	[610.0 ± 180.0]	5600 ± 1700
6A[c]	7/29/81	[200]	330	[70.0 ± 21.0]	110.0 ± 30.0
	7/15/81	[400]	440	[110.0 ± 30.0]	330.0 ± 100.0
10	8/18/81	[<5]	7	[0.8 ± 0.2]	0.3 ± 0.1
	9/16/81	<5	N.A.	0.2 ± 0.1	N.A.
11	8/18/81	52	N.A.	0.5 ± 0.2	N.A.
12	11/02/81	<5	N.A.	1.6 ± 0.5	N.A.
13	11/02/81	15	N.A.	0.5 ± 0.2	N.A.
14	9/16/81	[15]	<5	[16.0 ± 5.0]	<0.1
	11/02/81	5	N.A.	1.7 ± 0.5	N.A.
15	9/16/81	[7]	<5	[68.0 ± 20.0]	0.7 ± 0.2
	7/21/81	<5	N.A.	0.2 ± 0.1	N.A.
20S	8/18/81	[<5]	<5	[<0.1]	<0.1
	9/16/81	<5	N.A.	0.4 ± 0.1	N.A.
	11/02/81	<5	N.A.	0.3 ± 0.1	N.A.

TABLE 6-9
(Continued)

Well Number	Date Collected	Uranium (µg/l) Total [Suspended]	Uranium (µg/l) Dissolved	Radium-226 (pCi/l) Total [Suspended]	Radium-226 (pCi/l) Dissolved
	7/21/81	<5	N.A.	0.1 ± 0.1	N.A.
20D	8/18/81	<5	N.A.	0.2 ± 0.1	N.A.
	9/16/81	<5	N.A.	0.4 ± 0.1	N.A.
	11/02/81	6	N.A.	0.4 ± 0.1	N.A.
	7/21/81	<5	N.A.	0.1 ± 0.1	N.A.
21S	8/18/81	<5	N.A.	0.2 ± 0.1	N.A.
	9/16/81	<5		0.2 ± 0.1	N.A.
	11/02/81	<5	N.A.	0.1 ± 0.1	N.A.
	7/21/81	<5	N.A.	0.1 ± 0.1	N.A.
21D	8/18/81	<5	N.A.	0.1 ± 0.1	N.A.
	9/16/81	<5	N.A.	0.3 ± 0.1	N.A.
	11/02/81	<5	N.A.	0.1 ± 0.1	N.A.
	7/21/81	<5	N.A.	0.1 ± 0.1	N.A.
22D	8/18/81	<5	N.A.	<0.1	N.A.
	9/16/81	<5	N.A.	0.2 ± 0.1	N.A.
	11/02/81	<5	N.A.	0.3 ± 0.1	N.A.
	7/21/81	<5	N.A.	0.1 ± 0.1	N.A.
23D	8/18/81	<5	N.A.	0.2 ± 0.1	N.A.
	9/16/81	<5	N.A.	0.6 ± 0.2	N.A.
	11/02/81	<5	N.A.	0.5 ± 0.1	N.A.

(a) Results reported at a 95% confidence level

(b) N.A. Not analyzed

(c) Wells 2,7, and 8 were plugged in July 1980. Wells 6 and 6A were plugged in July 1981 to allow for storage pad construction.

TABLE 6-10

SUMMARY OF DISSOLVED URANIUM AND DISSOLVED RADIUM 226 IN GROUNDWATER

	Dissolved Uranium (ug/l)				Percent of	Dissolved Radium-226 (pCi/l)				Percent of
	Minimum	Maximum	Average[1]	Standard[2]	Standard (Avg.)	Minimum	Maximum	Average[1]	Standard[2]	Standard (Avg.)
On-site[3]	≤52	15,000	5,100	60,000	9	≤0.5	5,600	1,900	400	480
Off-site[4]	<5	25[5]	7	2,000	0.4	<0.1	5.4	1	30	3

[1] For those samples that were not analyzed for dissolved concentrations, the total concentration value was averaged.

[2] DOE Order 5480.1A, Chapter XI.

[3] On-site wells included only those that were on site and not near the site perimeter, i.e., Wells 6, 6A, and 11.

[4] Off-site wells included those that were off-site and the wells that were on-site, but near the site perimeter.

[5] The concentrations of dissolved uranium and dissolved radium-226 in the sample collected on 7/15/81 from Well 10 were 440 ug/l and 330 pCi/l, respectively. These concentrations were much higher than the concentrations in the samples collected on 7/21/81 from Wells 21D and 21S. Wells 10, 21D, and 21S are located a short distance from one another, with Wells 21D and 21S being closer to the site perimeter. The concentrations in the samples collected from Well 10 on 8/18/81 and 9/16/81 were less than or equal to 7 ug/l dissolved uranium and less than or equal to 0.3 pCi/l dissolved radium-226. Therefore, the results of the sample collected from Well 10 on 7/15/81 were not included in this summary table.

TABLE 6-11

DETERMINATION OF RADIUM-226 AND URANIUM

IN POTABLE WATER SAMPLES

(PRIVATE RESIDENCES)

Residence	Date Collected	Total Uranium (µg/l)	Total Radium-226 (pCi/l)
Butler 126 Mountain Ave.	7/28/81	5	0.1
Porowski 73 Desna St.	9/10/81	5	0.1
Lousten 45 Chicago Ave.	9/30/81	5	0.1
Caswell 609 William St.	10/13/81	5	1.0
Ianiero 225 Mountain Ave.	10/13/81	5	1.0

Results are reported at a 95% confidence level. Samples were obtained upon residents' requests.

TABLE 6-12

DETERMINATION OF RADIUM-226 AND URANIUM

IN SEDIMENT SAMPLES

Sample Number	Date Collected	Total Uranium (pCi/g)[a]	Total Radium-226 (pCi/g)[a]
		SOUTH OUTFALL	
W2072	8/18/81	400.0 ± 20.0[b]	39.0 ± 12.0
W2131	9/17/81	2.4	2.3 ± 0.1
W2196	11/12/81	25.0	0.5 ± 0.2
		MAIN STREAM	
W2071	8/18/81	9.5 ± 0.1	1.9 ± 0.6
W2130	9/17/81	11.5	2.2 ± 0.1
W2155	10/15/81	5.7	2.8 ± 0.8
W2192	11/12/81	7.0	1.9 ± 0.6

(a) Results are reported at a 95% confidence level.

(b) Sample was collected prior to the start of remedial action in the South Drainage Ditch area and therefore represents pre-remedial action conditions.

TABLE 6-13

SUMMARY OF RADIUM-226 AND URANIUM IN SEDIMENT SAMPLES

Sampling Location	Total Uranium Concentration (pCi/g)			Percent of Standard[1] (Avg.)	Total Radium-226 Concentration (pCi/g)			Percent of Standard[1] (Avg.)
	Minimum	Maximum	Average		Minimum	Maximum	Average	
South Outfall	2.4	400.0 ± 20.0[2]	142.4	356.0	0.5 ± 0.2	39.0 ± 12.0	13.9	278.0
Main Stream	5.7	11.5	8.4	1.0	1.9 ± 0.6	2.8 ± 0.8	2.2	44.0

[1] DOE limit for uranium in soil was 40 pCi/g and the limit for radium-226 in soil was 5 pCi/g above background during 1981 remedial action. Background for radium-226 in soil in the Middlesex area is 1 pCi/g.

[2] Sample was collected prior to the start of remedial action in the South Drainage Ditch area and therefore represents pre-remedial action conditions.

radium-226 concentration of 0.5 pCi/g-dry. From these data and the fact that all plant substance ultimately decomposes, a maximum radium-226 concentration for unrestricted use of the wood was conservatively calculated to be 1.0 pCi/g-dry plus background. Based on an average moisture content of 40 percent, a release limit of 1 pCi/g-moist was used in the field. This in-field analysis avoided delays in hauling wood chips or releasing logs.

6.2.5 External Gamma Radiation

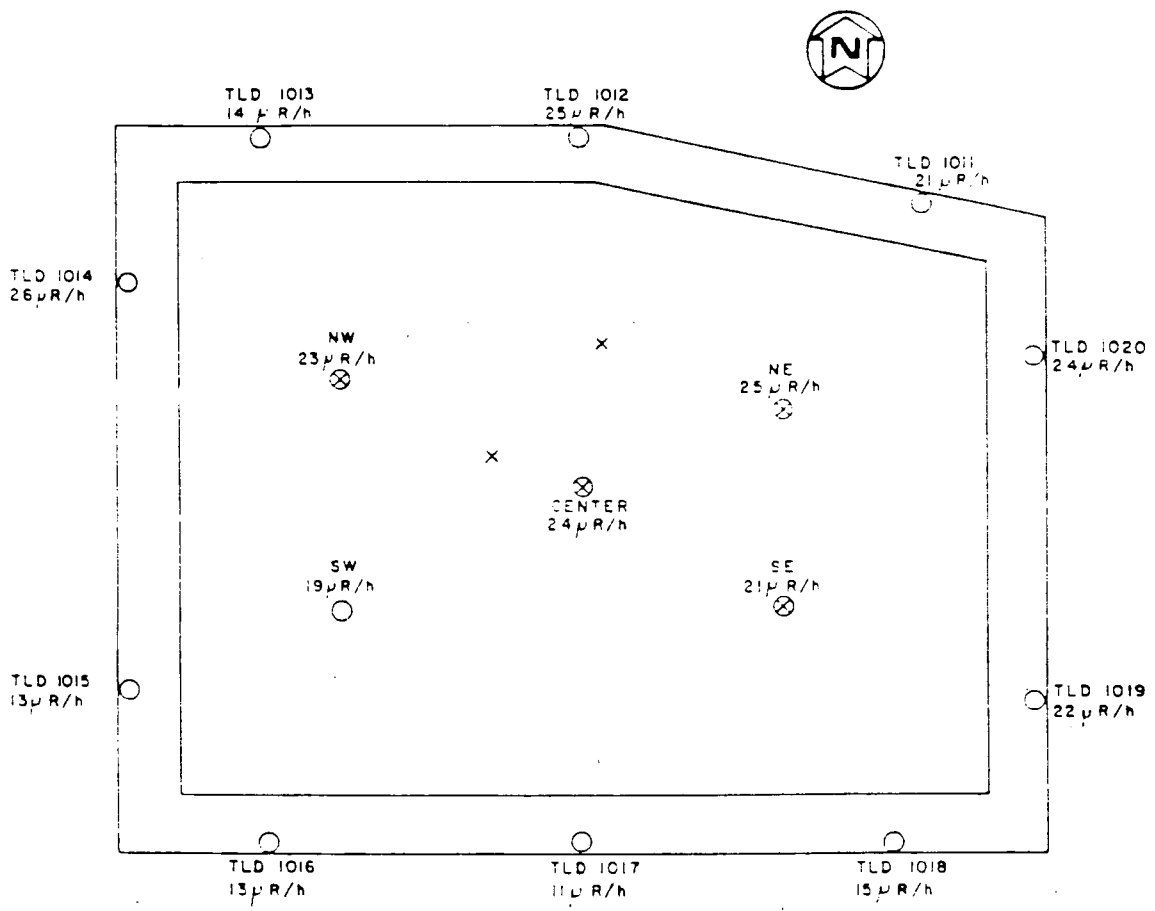
Area environmental TLD badges were positioned at various locations at the former MSP and exchanged quarterly. Locations of TLDs are illustrated on Figure 6-6. A packet of five TLD chips was used at each location. The average exposure rate recorded from these packets ranged from 11 μR/h to 26 μR/h (Figure 6-6). Based on the DOE Order 5480.1A guideline of 60 μR/h (500 mrem/yr) above background and the average background exposure rate in the Middlesex area, 8.2 μR/h, the average exposure rate was 30 percent of the guideline value. Environmental TLD results are summarized in the Environmental Monitoring Report, 1980, 1981, 1982 for the Former Middlesex Sampling Plant and Middlesex Municipal Landfill Sites.

6.3 CONFIRMATION SUMMARY

Evaluation of data collected after removal of the contaminated material indicated compliance with remedial action criteria. The criteria used and data supporting this evaluation are presented and discussed in Volume 2 of this report. The data are individually evaluated for each parcel of land included in the remedial action. Also included in Volume 2 is a brief discussion of the measurement and sampling techniques used.

6.4 RADON FLUX MEASUREMENTS

After all contaminated soils were located on the storage pad and soil had been compacted and contoured, radon flux measurements were made at six locations on the pile (Figure 6-6). These measurements



○ TLD MONITORING LOCATIONS

X RADON FLUX MEASUREMENT LOCATIONS

BASED ON EIC ENVIRONMENTAL TLD QUALITY ASSURANCE TESTS, THESE READINGS SHOULD BE WITHIN 10 PERCENT OF ACTUAL EXPOSURE RATE.

FIGURE 6-6 ENVIRONMENTAL TLD AND RADON FLUX MONITORING LOCATIONS AT THE FORMER MSP SITE STORAGE PILE

indicated an emanation rate from the pile ranging from 0.1 to 1.3 pCi/m^2s with an average rate of 0.4 pCi/m^2s. After placement and sealing of the impermeable cover over the pile, gamma exposure rates were measured on and around the pile. Measured dose rates ranged from 11 to 26 μR/h. The gamma exposure rates and radon flux from the storage area do not constitute a hazard to the general public nor to employees at the former MSP.

6.5 RADIOLOGICAL SUPPORT OF INCINERATION OPERATIONS

During the incineration of organic materials, three types of air sampling were performed.

Radon was measured continuously using an continuous radon gas monitor placed downwind in the optimum position for intercepting the smoke plume. Grab samples were also taken of the smoke plume at remote areas using a 1.4-l Lucus chamber. The average radon concentration during any 24-hour period based on both sampling techniques was 0.33 pCi/l $\pm$ 0.15 pCi/l (2σ). Measured values, presented in Figure 6-5, were well below the applicable criterion, 3.0 pCi/l radon-222.

Air particulate samples were collected continuously at the four cardinal compass points around the storage pad area. Filters were changed daily unless filter loading warranted a more frequent exchange. The average gross alpha activity in any 24-hour period, 0.02 pCi/m^3 $\pm$ 0.01 pCi/m^3 (2σ), was less than the most restrictive limit. Gross alpha concentrations in air during incineration are presented in Figure 6-2.

Fallout trays were used at various locations around the former MSP and off-site properties. The trays were placed in the sample locations before the burning process began and retrieved a few hours after the last loading of the burner. Trays were also positioned on non-burning days to collect background data. Like the radon samplers, most of the trays were placed downwind of the burner in order to catch material from the plume. Grab samples were taken periodically of material that either appeared in a heavy

concentration or was unusual in character. Five trays remained at the same locations for the duration of the burning process, regardless of conditions, to further ensure adequate monitoring of exposures of nearby residents. These fixed locations were:

- Parcel 2 (Backyard)
- Parcel 17 (Frontyard)
- "DOE" Well No. 14
- Main Stream/South Ditch Confluence
- Parcel 24 (Shed)

Data collected from the fallout trays are presented in Table 6-14.

Typically three approximately 1-gal samples of incineration residue were collected each day that the incinerator was cleaned of ash. Samples were analyzed for radium-226 content using the sodium iodide (NaI) scanning technique. Results are presented in Table 6-15. All incinerator residue is stored as radioactive waste.

All equipment used by the subcontractor was tested for radioactive contamination prior to beginning work at the site and again before leaving it. No elevated radiation levels were detected.

TABLE 6-14

GROSS ALPHA CONCENTRATION ON FALLOUT TRAYS FROM INCINERATION

Date	Duration of Burn (hours)	$pCi/cm^2/h$ Gross Alpha	Wind Speed (mph)
01-07-82	12*	0.006	--
01-08-82	10	0.0008	--
01-11-82	8.5	0.0001	25-30
01-12-82	9	0.0002	10-15
01-13-82	9.5	0.003	Calm -10
01-14-82	6*	0.0001	Calm -5
01-15-82	8	0.01	Inversion
01-19-82	9	0.005	Calm
01-20-82	4	0.005	5-10

*Background

TABLE 6-15

RADIUM-226 CONCENTRATIONS IN SOIL, SOIL/ASH, AND ASH SAMPLES FROM INCINERATION

Sample Identification	Collection Date	Weight (g)	pCi/g $\pm$ 2σ
Soil/Ash #1	01/07/82	2161	4.3 $\pm$ 0.1
Ash #2	01/08/82	1669	3.2 $\pm$ 0.1
Ash #3	01/08/82	1385	4.3 $\pm$ 0.1
Soil/Ash #4	01/13/82	1953	4.4 $\pm$ 0.1
Soil/Ash #5	01/13/82	1199	6.0 $\pm$ 0.1
Soil #6	01/13/82	1924	5.0 $\pm$ 0.1
Ash #7	01/15/82	1565	10.0 $\pm$ 1.0
Soil/Ash #8	01/15/82	1561	6.5 $\pm$ 0.1
Soil #9	01/15/82	1799	4.8 $\pm$ 0.1
Soil #10	01/19/82	1840	2.8 $\pm$ 0.1
Soil/Ash #11	01/19/82	1503	11.0 $\pm$ 1.0
Soil/Ash #12	01/19/82	1352	6.6 $\pm$ 0.1
Soil #13	01/21/82	1014	3.4 $\pm$ 0.1
Ash #14	01/21/82	605	14.0 $\pm$ 1.0
Soil/Ash #15	01/21/82	852	7.9 $\pm$ 0.1

7.0 QUALITY ASSURANCE PROGRAM

The Project Plan for Phase II required that NLO prepare a Quality Assurance Program as part of their engineering design. It was to cover specific procedures to be followed, responsibilities and control of subcontractors, and applicable standards.

Objective evidence was to be obtained during remedial action to ensure that adequate attention was given to quality in each activity. Factors to be considered and controlled were:

- Acquisition of valid technical data
- Personnel and public health and safety
- Environmental protection
- Reliable remedial and disposal operations.

Implementation of the Quality Assurance Program was continued by BNI upon assuming the responsibilities of PMC. Documentation of satisfactory performance is on file at the BNI Oak Ridge office.

Quality control was conducted by field engineers according to inspection procedures described in the BNI Quality Control Manual. The major items of construction were checked and documented by Quality Control Inspection Records in the field. Project plans were continually reviewed by field personnel in an effort to anticipate any potential problems prior to the start of each activity.

8.0 POST REMEDIAL ACTION SURVEILLANCE

8.1 STORAGE PILE COVER

Routine inspection of the storage pile cover is one of the more important post-remedial action activities. It will be inspected monthly to ensure that all seams have remained intact and that no vandalism or environmental deterioration has occurred. In the event that repairs are required, the maintenance procedure supplied by Enviroclear during under Phase I construction will be used.

8.2 FLOCCULATION SYSTEM

A spring, summer, and fall maintenance schedule will be conducted for the flocculation system at the settling basin. The schedule generally provides for the flocculant tanks to be filled each spring, drained at the onset of winter, and checked periodically for sufficient flocculant levels during the operational period. A new supply of flocculants, Calgon L635 and liquid alum, will be required each year as the supply is depleted.

8.3 AIR AND WATER SAMPLING

Sampling of air and water on and around the site will continue at regular prescribed intervals, with samples being forwarded to EIC laboratories for analyses. Samples will be recovered from nineteen monitoring wells, five air particulate samplers, sixteen radon gas samplers, and twenty area TLDs. The locations on or immediately adjacent to the site are shown in Figure 8-1. Sampling will be conducted by site personnel under the guidance of the BNI Safety and Licensing Department, Oak Ridge.

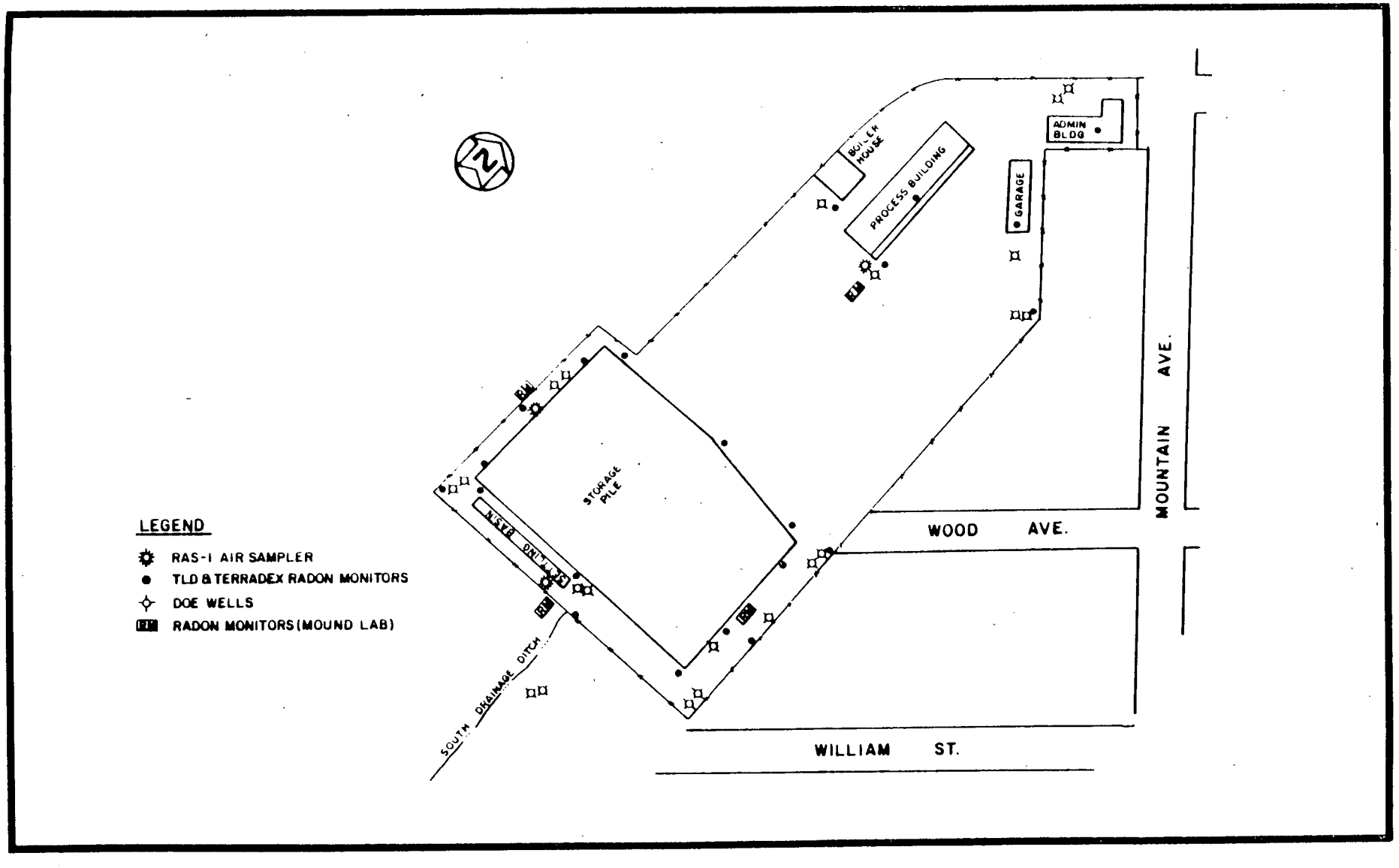


FIGURE 8-1 ENVIRONMENTAL MONITORING SAMPLE POINTS AT THE FORMER MSP SITE

8.4 MAINTENANCE AND SECURITY MEASURES

Site personnel continue to provide for plant safety, security, and maintenance within the fence boundaries of the site. Upkeep and janitorial services are also provided for the Process Building, the Garage, the Administration Building, and the Boiler House. Site personnel are available 24 hours every day for emergency services and work in cooperation with local police and fire departments in monitoring the plant warning alarms for smoke and fire detection. Seasonal services such as lawn care and snow removal are also provided, the latter being especially important in maintaining fire lanes.

9.0 PUBLIC PARTICIPATION DURING THE REMEDIAL ACTION

The Borough of Middlesex served as the liaison between the public and NLO/BNI during Phase II. Biweekly status meetings between Borough officials, including the Board of Health, and NLO/BNI were held to inform Middlesex and Piscataway residents and to invite their input.

The Township Engineer was the local contact for the Phase II activities performed in Piscataway. No public meetings were held in Piscataway since Phase II activities on Piscataway parcels were not a serious issue with the citizens, and the mayor of Middlesex had an understanding with the mayor of Piscataway that the former would oversee the remedial action.

The Phase II remedial action program at Middlesex was of concern to the local press. NLO/BNI made a particular effort to keep the local citizens informed. Communication with the Middlesex Chronicle, Middlesex and the Courier News, Bridgewater Township was maintained through telephone contacts, site visits, and by reporters' attendance at the public meetings.

10.0 COST

The final subcontract bid item quantities and costs for Phase II of the Middlesex remedial action are shown in Table 10-1. Contract construction, excavation, and restoration costs have been analyzed in Table 10-2 and proportional costs divided among all parcels involved. A comparison of the Phase I and Phase II costs for excavation is presented in Table 10-3.

10.1 CHANGE ORDERS

During Phase II, 29 Change Orders to the Reid/Ashland subcontract were issued due to Memo Agreement revisions, landowner-requested changes, differing site conditions, and minor changes in design. These Change Orders were settled for the amount of $55,662.84. This did not include an amount to compensate the subcontractor for the deletion of remedial action on Parcels 7 and 33. For these, Reid/Ashland claimed reimbursement to cover a disproportionate amount of indirect costs said to have been included here as in other Lump Sum items. The subcontractor claimed $36,987.97 of the cancelled $42,300 total.

10.2 CLAIMS

At completion of the work, Reid/Ashland formalized a number of claims, some of which had been previously submitted or alluded to in subcontractor communications with the field office.

Two major claims covered backfill and excavations. The backfill claim was based on a measurement clause relating volume of backfill to volume of excavation less "areas not backfilled." This was interpreted by BNI to require the exclusion of topsoil and aggregate base quantities from the excavation measured volume. Reid/Ashland based its claim for an increase in quantity on unsupported truck counts and shrinkage factors. The amount of the claim was $51,975.30.

TABLE 10-1
MIDDLESEX PHASE II
FINAL BID ITEM QUANTITIES AND COSTS

ITEM	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	FINAL INSTALLED QUANTITY	FINAL AMOUNT ($)
1.0	AGGR. BASE COURSE	2430	Tons	15.00	3,645.30	54,679.50
2.0	BITUMINOUS CONCRETE	950	Tons	40.00	1,261.53	50,461.20
3.0	NOT USED	--	--	--	--	--
4.0	BACKFILL	38000	Cu. Yd.	6.50	17,488.60	113,675.90
5.0	PERMANENT FENCING	--	--	--	--	--
5.1	7' High Vinyl-Coated Chain Link Fence	2950	Lin. Ft.	15.00	2,948.08	44,221.20
5.2	6' High Galvanized Chain Link Fence	400	Lin. Ft.	13.00	373.34	4,853.42
5.3	4' High Galvanized Chain Link Fence	150	Lin. Ft.	10.00	60	600.00
5.4	4' High Wood Picket Fence	70	Lin. Ft.	5.00		--
6.0	CONCRETE	--	--	--	--	--
6.1	4" Thick Concrete Sidewalk	300	Sq. Yd.	25.00	246.50	6,162.50
6.2	Reinforced Concrete in Structures	165	Cu. Yd.	810.00	168.30	136,323.00
6.3	Concrete in Curbs and Gutters	165	Cu. Yd.	250.00	138.20	34,550.00
7.0	DEMOLITION OF THAW HOUSE	Lump	Sum	10,000.00	100%	10,000.00
8.0	DRAINAGE AND DIVERSION DITCH	--	--	--	--	--
8.1	Temporary Diversion Ditch	4000	Lin. Ft.	5.00	3,195	15,975.00
8.2	Permanent or Restored Ditches	3500	Lin. Ft.	5.00	3,089	15,445.00
9.0	DROP INLETS	5	Ea.	1000.00	5	5,000.00
10.0	ELECTRIC POLES AND LIGHTING	Lump	Sum	3,674.00	100%	3,674.00
11.0	EXCAVATION	40000	Cu. Yd.	3.00	31,795.50	95,386.50
12.0	GRATES	--	--	--	--	--
12.1	Relocate Existing Grates	4	Ea.	300.00	4	1,200.00
12.2	Relocate Existing Frames	2	Ea.	300.00	2	600.00
12.3	Furnish and Install New Grate	1	Ea.	500.00	1	500.00
12.4	Furnish and Install New Frame	3	Ea.	500.00	3	1,500.00
13.0	HAUL ROAD	Lump	Sum	10,000.00	100%	10,000.00
14.0	IMPERMEABLE BARRIER	1000	Cu. Yd.	45.00	Deleted	Deleted
15.0	NOT USED	--	--	--	--	--
16.0	METAL STORAGE SHED	Lump	Sum	2,000.00	100%	2,000.00
17.0	PIPING	--	--	--	--	--
17.1	12" B.C.C.M.P.	830	Lin. Ft.	30.00	785.17	23,555.10
17.2	18" B.C.C.M.P.	240	Lin. Ft.	40.00	229.08	9,163.00
17.3	30" R.C.P., Standard Strength	250	Lin. Ft.	40.00	--	--
17.4	6" Ductile Iron Pipe	160	Lin. Ft.	25.00	33.17	829.00
17.5	Relocate Existing Fire Hydrant	1	Ea.	500.00	1	500.00
18.0	PLANTINGS	--	--	--	--	--
18.1	Parcel No. 1	Lump	Sum	12,000.00	100%	12,000.00
18.2	Parcel No. 2	Lump	Sum	6,800.00	100%	6,800.00
18.3	Parcel No. 3	Lump	Sum	1,200.00	100%	1,200.00
18.4	Parcel No. 4	Lump	Sum	6,500.00	100%	6,500.00
18.5	Parcel No. 5	Lump	Sum	18,500.00	100%	18,500.00
18.6	Parcel No. 6	Lump	Sum	8,300.00	100%	8,300.00
18.7	Parcel No. 7	Lump	Sum	2,300.00	Deleted	Deleted
18.8	Not Used	--	--	--	--	--
18.9	Parcel No. 17	Lump	Sum	7,800.00	100%	7,800.00
19.0	NOT USED	--	--	--	--	--
20.0	SEEDING AND SODDING	--	--	--	--	--
20.1	Seeding	13.6	Acre	2,000.00	10.9	21,800.00
20.2	Sod	2840	Sq. Yd.	3.00	2,847.40	8,542.20
20.3	Topsoil	7990	Cu. Yd.	10.00	5,962.00	59,620.00
21.0	ROCK RIPRAP	1950	Cu. Yd.	25.00	1,761.40	44,035.00
22.0	SITE CLEARING	--	--	--	--	--
22.1	Parcel No. 1	Lump	Sum	20,000.00	100%	20,000.00
22.2	Parcel No. 2	Lump	Sum	20,000.00	100%	20,000.00
22.3	Parcel No. 3	Lump	Sum	20,000.00	100%	20,000.00
22.4	Parcel No. 4	Lump	Sum	20,000.00	100%	20,000.00
22.5	Parcel No. 5	Lump	Sum	20,000.00	100%	20,000.00
22.6	Parcel No. 6	Lump	Sum	20,000.00	100%	20,000.00
22.7	Parcel No. 7	Lump	Sum	20,000.00	Deleted	Deleted
22.8	Parcel No. 17	Lump	Sum	20,000.00	100%	20,000.00
22.9	Parcel No. 24	Lump	Sum	20,000.00	100%	20,000.00
22.10	Parcel No. 33	Lump	Sum	20,000.00	Deleted	Deleted
22.11	All Other Parcels	14	Acre	1,000.00	11.8	11,800.00
23.0	STORAGE PILE	19750	Sq. Yd.	1.00	9,356.8	9,356.80
24.0	SWIMMING POOL	1	Ea.	1,000.00	1	1,000.00
25.0	MONITORING WELLS	Lump	Sum	15,000.00	100%	15,000.00
26.0	FLOCCULATOR SYSTEM	Lump	Sum	25,000.00	100%	25,000.00
27.0	REMOVE CONCRETE PIERS & BLOCK WALL	Lump	Sum	5,000.00	100%	5,000.00
28.0	REMOVE EXISTING SETTLING TANKS	Lump	Sum	5,000.00	100%	5,000.00
29.0	STEEL BAFFLES IN SETTLING BASIN	Lump	Sum	3,000.00	100%	3,000.00
CHANGE ORDERS AND CLAIMS		Lump	Sum			157,291.28
	TOTAL					1,228,400.00

TABLE 10-2
MIDDLESEX PHASE II
CONSTRUCTION COST PER PARCEL

ITEM	Unit	Parcel 1 Qty.	Parcel 1 Cost	Parcel 2 Qty.	Parcel 2 Cost	Parcel 3 Qty.	Parcel 3 Cost	Parcel 4 Qty.	Parcel 4 Cost	Parcel 5 Qty.	Parcel 5 Cost	Parcel 6 Qty.	Parcel 6 Cost
Aggr. Base	Tn	142	2,130	83	1,249	58	870	118	1,770	92	1,380	61	915
Bituminous Concrete	Tn	-	-	6	240	-	-	-	-	-	-	-	-
Backfill	CY	521	3,387	269	1,749	101	657	168	1,092	538	3,497	353	2,295
Site Fencing	LF	-	-	-	-	-	-	-	-	-	-	-	-
4' Fence	LF	-	-	-	-	-	-	-	-	60	600	-	-
Concrete Sidewalk	SY	110	2,750	17	437	34	850	25	625	13	325	13	325
Concrete (Site)	CY	-	-	-	-	-	-	-	-	-	-	-	-
Demolition	LS	-	-	-	-	-	-	-	-	-	-	-	-
Ditches	LF	-	-	-	-	-	-	-	-	-	-	-	-
Site Drainage	LF	-	-	-	-	-	-	-	-	-	-	-	-
Electric & Lighting	LS	-	-	-	-	-	-	-	-	-	-	-	-
Excavation	CY	802	2,406	410	1,230	158	474	254	762	821	2,463	547	1,641
Haul Road	LS	-	-	-	-	-	-	-	-	-	-	-	-
Personal Items	LS	-	-	LS	2,000	-	-	-	-	LS	1,000	-	-
Relocate Fire Hyd.	LS	-	-	-	-	-	-	-	-	-	-	-	-
Plantings	LS	LS	12,000	LS	6,800	LS	1,200	LS	6,500	LS	18,500	LS	8,300
Seeding	Ac	.25	500	.16	320	.06	120	.03	60	.04	80	.07	140
Sod	SY	1,206	3,618	409	1,227	86	258	154	462	306	918	244	730
Topsoil	CY	271	2,710	131	1,310	45	450	76	760	273	2,730	184	1,840
Riprap	CY	-	-	-	-	-	-	-	-	-	-	-	-
Clearing	Ac	LS	20,000	LS	20,000	LS	20,000	LS	20,000	LS	20,000	LS	20,000
Storage Pile	SY	-	-	-	-	-	-	-	-	-	-	-	-
Monitor Wells	LS	-	-	-	-	-	-	-	-	-	-	-	-
Flocc. System	LS	-	-	-	-	-	-	-	-	-	-	-	-
Change Orders	LS	LS	3,452	LS	11,693	LS	6,273	LS	4,023	LS	3,452	LS	3,452
TOTAL			52,953		48,255		31,152		36,054		54,945		39,638

TABLE 10-2
(continued)

ITEM	Unit	Parcel 10 Qty.	Parcel 10 Cost	Parcel 11 Qty.	Parcel 11 Cost	Parcel 12 Qty.	Parcel 12 Cost	Parcel 13 Qty.	Parcel 13 Cost	Parcel 14 Qty.	Parcel 14 Cost	Parcel 15 Qty.	Parcel 15 Cost
Aggr. Base	Tn	-	-	-	-	-	-	-	-	-	-	-	-
Bituminous Concrete	Tn	-	-	-	-	-	-	-	-	-	-	-	-
Backfill	Cy	185	1203	84	546	336	2,184	387	2,516	286	1,859	168	1,092
Site Fencing	LF	-	-	-	-	-	-	-	-	-	-	-	-
4' Fence	LF	-	-	-	-	-	-	-	-	-	-	-	-
Concrete Sidewalk	SY	-	-	-	-	-	-	-	-	-	-	-	-
Concrete (Site)	CY	-	-	-	-	-	-	-	-	-	-	-	-
Demolition	LS	-	-	-	-	-	-	-	-	-	-	-	-
Ditches	LF	-	-	-	-	-	-	-	-	-	-	-	-
Site Drainage	LF	-	-	-	-	-	-	-	-	-	-	-	-
Electric & Lighting	LS	-	-	-	-	-	-	-	-	-	-	-	-
Excavation	CY	295	885	137	411	528	1,584	587	1,761	430	1,290	254	762
Haul Road	LS	-	-	-	-	-	-	-	-	-	-	-	-
Personal Items	LS	-	-	-	-	-	-	-	-	-	-	-	-
Relocate Fire Hyd.	LS	-	-	-	-	-	-	-	-	-	-	-	-
Plantings	LS	-	-	-	-	-	-	-	-	-	-	-	-
Seeding	Ac	.15	300	.07	140	.27	540	.30	600	.30	600	.13	260
Sod	SY	-	-	-	-	-	-	-	-	-	-	-	-
Topsoil	CY	150	1,500	76	760	192	1,920	200	2,000	144	1,440	86	860
Riprap	CY	-	-	-	-	-	-	-	-	-	-	-	-
Clearing	Ac	.15	150	.07	70	.27	270	.30	300	.30	300	.13	130
Storage Pile	Sy	-	-	-	-	-	-	-	-	-	-	-	-
Monitor Wells	LS	-	-	-	-	-	-	-	-	-	-	-	-
Flocc. System	LS	-	-	-	-	-	-	-	-	-	-	-	-
Change Orders	LS	LS	3,452	LS	3,452	LS	3,452	LS	3,452	LS	3,452	LS	3,452
TOTAL			7,940		5,379		9,950		10,629		8,941		6,556

TABLE 10-2
(continued)

ITEM	Unit	Parcel 17 Qty.	Parcel 17 Cost	Parcel 18 Qty.	Parcel 18 Cost	Parcel 19 Qty.	Parcel 19 Cost	Parcel 20 Qty.	Parcel 20 Cost	Parcel 21 Qty.	Parcel 21 Cost	Parcel 22 Qty.	Parcel 22 Cost
Aggr. Base	Tn	35	525	-	-	-	-	-	-	-	-	-	-
Bituminous Concrete	Tn	-	-	-	-	-	-	-	-	-	-	-	-
Backfill	CY	84	546	673	4,375	824	5,356	2,843	18,480	1,884	12,246	572	3,718
Site Fencing	LF	-	-	-	-	-	-	-	-	-	-	-	-
4' Fence	LF	-	-	-	-	-	-	-	-	-	-	-	-
Concrete Sidewalk	SY	28	700	-	-	-	-	-	-	-	-	-	-
Concrete (Site)	CY	-	-	-	-	-	-	-	-	-	-	-	-
Demolition	LS	-	-	-	-	-	-	-	-	-	-	-	-
Ditches	LF	-	-	630	3,150	-	-	-	-	-	-	912	4,560
Site Drainage	LF	-	-	-	-	-	-	-	-	-	-	-	-
Electric & Lighting	LS	-	-	-	-	-	-	-	-	-	-	-	-
Excavation	CY	117	351	1,203	3,609	1,252	3,756	4,344	13,032	2,896	8,688	1,786	5,358
Haul Road	LS	-	-	LS	480	LS	1,190	LS	1,370	LS	1,370	LS	830
Personal Items	LS	-	-	-	-	-	-	-	-	-	-	-	-
Relocate Fire Hyd.	LS	-	-	-	-	-	-	-	-	-	-	-	-
Plantings	LS	LS	7,800	-	-	-	-	-	-	-	-	-	-
Seeding	Ac	-	-	.24	480	.56	1,420	.73	1,460	.73	1,460	.80	1,600
Sod	SY	427	1,281	-	-	-	-	-	-	-	-	-	-
Topsoil	CY	30	300	288	2,880	342	3,420	1,093	11,080	693	6,930	198	1,980
Riprap	CY	-	-	82	2,035	-	-	-	-	-	-	285	7,125
Clearing	Ac	LS	20,000	.31	310	.69	690	.90	900	.90	900	.90	900
Storage Pile	SY	-	-	-	-	-	-	-	-	-	-	-	-
Monitor Wells	LS	-	-	-	-	-	-	-	-	-	-	-	-
Flocc. System	LS	-	-	-	-	-	-	-	-	-	-	-	-
Change Orders	LS	LS	4,810	LS	3,452	LS	3,452	LS	3,452	LS	3,452	LS	3,452
TOTAL			36,313		20,771		19,284		49,774		35,046		29,523

TABLE 10-2
(continued)

ITEM	Unit	Parcel 22A Qty.	Parcel 22A Cost	Parcel 22B Qty.	Parcel 22B Cost	Parcel 23 Qty.	Parcel 23 Cost	Parcel 23A Qty.	Parcel 23A Cost	Parcel 23B Qty.	Parcel 23B Cost	Parcel 24 Qty.	Parcel 24 Cost
Aggr. Base	Tn	-	-	-	-	-	-	-	-	-	-	1,589	23,835
Bituminous Concrete	Tn	-	-	-	-	-	-	-	-	-	-	174	6,960
Backfill	CY	135	878	17	111	1,278	8,307	437	2,841	84	546	1,884	12,246
Site Fencing	LF	-	-	-	-	-	-	-	-	-	-	-	-
4' Fence	LF	-	-	-	-	-	-	-	-	-	-	-	-
Concrete Sidewalk	SY	-	-	-	-	-	-	-	-	-	-	2	50
Concrete (Site)	CY	-	-	-	-	-	-	-	-	-	-	-	-
Demolition	LS	-	-	-	-	-	-	-	-	-	-	-	-
Ditches	LF	406	2,030	46	230	2,022	10,110	803	4,015	244	1,220	-	-
Site Drainage	LF	-	-	-	-	-	-	-	-	-	-	-	-
Electric & Lighting	LS	-	-	-	-	-	-	-	-	-	-	-	-
Excavation	CY	398	1,194	43	129	3,967	11,901	1,345	4,034	240	720	2,896	8,688
Haul Road	LS	LS	190	LS	20	LS	1,850	LS	630	LS	110	-	-
Personal Items	LS	-	-	-	-	-	-	-	-	-	-	-	-
Relocate Fire Hyd.	LS	-	-	-	-	-	-	-	-	-	-	-	-
Plantings	LS	-	-	-	-	-	-	-	-	-	-	-	-
Seeding	Ac	.45	900	.10	200	1.75	3,500	1.10	2,200	.95	1,900	-	-
Sod	SY	-	-	-	-	-	-	-	-	-	-	-	-
Topsoil	CY	48	480	6	60	453	4,530	155	1,550	30	300	-	-
Riprap	CY	70	1,750	12	300	635	15,875	215	5,375	38	950	-	-
Clearing	Ac	.50	500	.10	100	2.00	2,000	1.32	1,320	1.10	2,100	LS	15,000
Storage Pile	SY	-	-	-	-	-	-	-	-	-	-	-	-
Monitor Wells	LS	-	-	-	-	-	-	-	-	-	-	-	-
Flocc. System	LS	-	-	-	-	-	-	-	-	-	-	-	-
Change Orders	LS	LS	3,452	LS	3,452	LS	3,452	LS	3,453	LS	3,452	LS	3,452
TOTAL			11,374		4,602		61,525		25,418		11,298		70,231

TABLE 10-2
(continued)

ITEM	Unit	Parcel 24A Qty.	Parcel 24A Cost	Parcel 28 Qty.	Parcel 28 Cost	Piscataway Qty.	Piscataway Cost	Middlesex Qty.	Middlesex Cost	Plant Site Qty.	Plant Site Cost
Aggr. Base	Tn	529	7,935	-	-	69	1,035	69	1,035	800	12,000
Bituminous Concrete	Tn	58	2,320	-	-	42	1,660	42	1,660	940	37,621
Backfill	CY	353	2,295	336	2,184	1,245	8,093	774	5,031	669	4,346
Site Fencing	LF	-	-	-	-	-	-	-	-	3,321	49,075
4' Fence	LF	-	-	-	-	-	-	-	-	-	-
Concrete Sidewalk	SY	-	-	-	-	-	-	-	-	4	100
Concrete (Site)	CY	-	-	-	-	-	-	-	-	306	170,873
Demolition	LS	-	-	-	-	-	-	-	-	LS	20,000
Ditches	LF	-	-	-	-	546	2,730	418	2,090	257	1,285
Site Drainage	LF	-	-	-	-	-	-	-	-	1,014	41,518
Electric & Lighting	LS	-	-	-	-	-	-	-	-	LS	3,674
Excavation	CY	548	1,644	1,071	3,213	2,149	6,447	1,316	3,948	1,000	3,000
Haul Road	LS	-	-	LS	500	LS	900	LS	560	-	-
Personal Items	LS	-	-	-	-	-	-	-	-	-	-
Relocate Fire Hyd.	LS	-	-	-	-	-	-	-	-	LS	1,329
Plantings	LS	-	-	-	-	-	-	-	-	-	-
Seeding	Ac	-	-	.76	1,520	.50	1,000	.25	500	-	-
Sod	SY	-	-	-	-	-	-	-	-	16	48
Topsoil	CY	-	-	119	1,190	411	4,110	268	2,680	-	-
Riprap	CY	-	-	171	4,275	157	3,925	97	2,425	-	-
Clearing	Ac	LS	5,000	0.86	860	0.70	700	0.30	300	-	-
Storage Pile	SY	-	-	-	-	-	-	-	-	9,357	9,359
Monitor Wells	LS	-	-	-	-	-	-	-	-	LS	15,000
Flocc. System	LS	-	-	-	-	-	-	-	-	LS	28,000
Change Order	LS	LS	9,949	LS	3,452	LS	3,453	LS	3,453	LS	41,141
TOTAL			29,143		19,924		38,413		22,877		437,082

GRAND TOTAL $1,228,400

TABLE 10-3

COMPARISON OF COSTS FOR EXCAVATION OF MIDDLESEX PROPERTIES
PHASE I VS PHASE II[a]

Item	Phase I		Phase II	
	Amount ($)	$/yd^3[b]	Amount ($)	$/yd^3[c]
Construction	2,019,071	214	1,228,400	48
Engineering	254,871	27	644,000	25
Radiological Support	466,076	49	573,000	22
Management (including construction, inspection, and support)	539,194	57	2,568,000	100
TOTAL	3,279,212	348	5,013,400	195

[a] Based on total construction cost applied against remedial excavation performed on adjacent properties

[b] Phase I excavation 9,421 yd^3

[c] Phase II excavation 25,742 yd^3

The excavation claim, $128,183.09, solicited a renegotiation in unit price based on an underrun in quantity of over 20 percent, triggering the approximately 15 percent variation in the Quantities Clause, allowing an equitable adjustment in the subcontract price.

In 58 minor claims totalling $45,885.53 the major areas for which Reid/Ashland claimed reimbursement were:

- "Excessive" pumping/dewatering costs incurred during extended certification surveys following excavation of parcels
- Costs related to an interim cleanup required to remove contaminated material scattered within the plant site, up-slope of the revised and reopened storm drain system
- Out-of-sequence costs for excavating earth and backfilling the space ultimately occupied by the reinstalled plant site perimeter fence
- Relocating and reshaping the storage pile to conform to reduced excavation quantities.

Table 10-4 presents the agreements reached in a meeting held on February 25, 1982 between BNI and Reid/Ashland. It shows that the final subcontract amount of $1,228,400 includes an amount of $77,713.96 that recognizes certain entitlements on the part of Reid/Ashland to recover a portion of the claimed extra costs.

The Blandford Land Clearing Corporation subcontract for incineration operations totalled $36,900.00.

TABLE 10-4

SUMMARY OF CLAIM SETTLEMENT MEETING

BETWEEN BNI AND REID/ASHLAND

FEBRUARY 25, 1982

Original Subcontract Amount			$1,356,644.00
Mutually Agreeable Adjustments			
a.	Deleted Bid Item #14	-$ 45,000.00	
b.	Final Quantity Variations	- 240,535.28	
c.	Field Changes-CE-1 thru CE-12, CE-14 thru CE-23, CE-26 thru CE-29	- 55,662.84	
d.	Reid/Ashland Claims - 4, 5, 6, 15,16, 18, 19, 22, 23, 25, 26, 27, 33, 34, 35, 39, 40, 43, 44, 49, 50, 53, 54, 55, 56, 57 and 58	23,914.48	
			- 205,957.96
	SUBTOTAL		$1,150,686.04

Unresolved Matters		Reid/Ashland Claim
a.	Field Changes CE 13, 24 & 25	$ 38,977.69
b.	Reid/Ashland Claims	
	1. Excavation	131,653.09
	2. Backfill	51,780.30
	3. Claims - 1,2,7, 12,13,14,20,21, 24,28,30,31,36, 38,41,42,45,46, 47,48,51, & 52	19,212.63
		$241,623.71

c.	Compromise Settlement of Unresolved Matters	$ 77,713.96
Final Agreed Subcontract Amount		$1,228,400.00

11.0 RECOMMENDATIONS

Following completion of the Phase II remedial action, the BNI field group and Oak Ridge management reviewed certain work and problems encountered that indicated the necessity for procedure modification on future remedial work in low-level activity areas. These issues are discussed below.

11.1 SOILS

The specification called for local subsoil to be used as backfill. Lack of further definition led to a conflict with the subcontractor in efforts to exclude material containing excessive amounts of shale, large stones, and/or fines. Future specifications should prohibit stones in excess of 4 in. size, 2 in. in the case of residential properties, and should define other specifically required characteristics. Material should be well graded, and for residential properties, have less than 20 percent passing a 200 seive.

A compaction of 95 percent Standard Proctor density was specified, but 85 percent is considered sufficient for residential properties.

Contaminated soils placed in the storage pile were specified to receive compaction to 95 percent Proctor density. Here, as in other anticipated cleanup areas, much of the contaminated soil is topsoil containing organic material, which may be saturated excavation material from ditch and stream bottoms. Compaction of 95 percent is difficult to achieve. This should be recognized in establishing criteria. Alternating this material with layers of compactable, contaminated subsoil is an acceptable procedure.

In a staged cleanup operation where a fence is a dividing line between stages, it is preferable to decontaminate the area beneath the fence in the first stage and then restore the fencing. This permits completion of restoration on stage one work and avoids a second disruptive activity at the time of stage two remedial activity.

11.2 WELLS

Cave-in of Phase I monitoring wells resulted in the loss of portions of several wells and interruption of data. Wells in shale should be cased. This was done for Phase II wells.

11.3 RESTORATION

11.3.1 Completion Process

Rapid completion of restoration on residential parcels is of paramount importance to the owners. The subcontract specification recognized this and called for an uninterrupted work operation from the time of EIC certification as ready for backfill through completion to "a reasonable level of use". However, since there was no penalty for failure to pursue a continuous program, the subcontractor elected to perform fill and other restoration items by groups of parcels on an intermittent schedule which he considered would use his forces more cost-effectively.

Consequently periods of up to 4-1/2 months elapsed between the start of excavation and completion of restoration. Part of the reason for this was the interpretation of "reasonable level of use". The subcontractor felt that once he had backfilled the property he had fulfilled this obligation. The land owner wanted all restoration complete. This was an irritant to owners and created bad public relations.

To avoid this problem in the future, it is suggested that a form of penalty be considered for assessment against the subcontractor for failure to complete restoration on similar parcels.

11.3.2 Access Agreement Interpretation

Misunderstandings by owners of the provisions of the access agreements and differences between access agreements and the subcontract made it difficult for the subcontractor to perform landscaping. Selection of a landscape subcontractor was postponed, then abandoned. Dissatisfaction remains on the part of several owners.

To alleviate problems of this type, special care must be exercised during the preparation of the access agreements, and once executed, work must be rigidly controlled to ensure strict compliance with the agreement.

11.4 FLOCCULATOR SYSTEM

This system was designed to remove suspended solids in site runoff water. It was intended to improve the capability at the site for preventing dispersal of contaminated material from the pad.

However, the subcontract did not provide for early completion of this system. Therefore, because it was comparatively complex and required some subcontractor-vendor engineering input, it was not scheduled for early completion by the subcontractor. The system was not completed until the site work was complete, and it was then shut down for the winter.

Similar installations intended to provide restraints to the spread of radioactivity during construction should, where applicable, be supported by contract terms requiring timely completion.

11.5 CONTRACT TERMS

Clearing of three parcels was deleted from the subcontract because they did not require remedial work. The subcontractor argued in favor of a major percentage recovery of this deleted price, stating that he had included a high percentage of his overhead costs in the Lump Sum items.

To avoid this in the future, subcontracts should state that deletion of work entailed in any Lump Sum item also deletes that Lump Sum price in its entirety.

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